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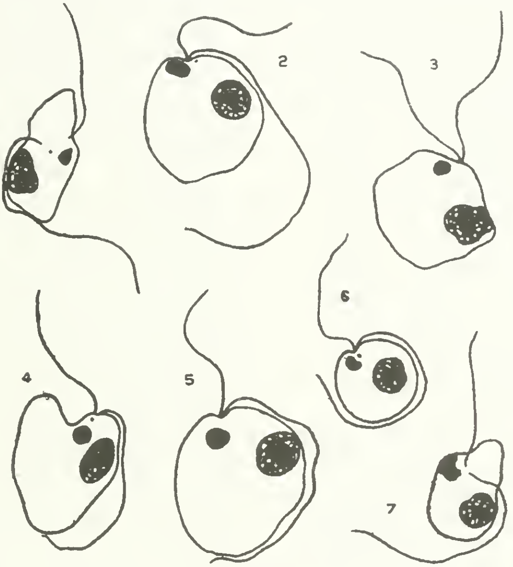
* *Note to Binder.*—These are to be bound to follow the last number in the volume of the Journal of Tropical Medicine and Hygiene.

Original Communication.

A FLAGELLATE FREQUENTING THE NECKS OF BOTTLES.

By J. W. S. Macfie, D.Sc.
West African Medical Staff.

At Accra flagellates very rapidly make their appearance in the necks of bottles of saline solution or distilled water exposed in the laboratory. The organisms appear to multiply in the thin layer of fluid held between the neck of the bottle and the ground glass stopper, and can always be demonstrated in this situation a day or two after the bottles have been placed on the benches. They are found, however, with the greatest difficulty in the fluids inside the bottles, and do not appear to increase appreciably in numbers. The flagellates have never been found abundantly, each drop of fluid examined containing only a few individuals, and in culture media they have always died off rapidly or been overgrown by bacilli, so that sufficient materials have not been available for a complete study of their morphology. At laboratory temperatures they could be kept alive in peptone water, dilute broth solution and similar media, but at 37° C. they did not long survive. The organisms presumably reached the bottle-necks as cysts borne through the air as they appeared in vessels that had been thoroughly sterilized.



Figs. 1-7.—*Prowazekia aquae*, n. sp. × 3,000.

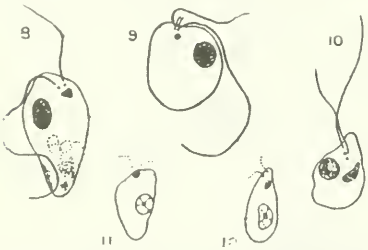
Movements.—The living organisms were exceedingly active and were with difficulty kept in the field of the microscope. The movement were jerky and intermittent, the flagellates every now and then anchoring themselves to some object by one flagellum whilst continuing to lash vigorously with the other. The body, although usually constant in form, appeared to be capable of a considerable degree of distortion. The smallest forms appeared to be the most active.

Morphology.—The flagellates appeared to belong to the genus of Bodonidæ, in which are included forms possessing a kinetonucleus, that is, to the *Prowazekia* of Hartmann and Chagas. The organism was highly polymorphic, varying both in size and shape. Most commonly the body was rounded or oval, but a few individuals were seen that might have been described as "sausage-shaped," and some tapered at their posterior ends. The oval forms measured from 8 to 10 microns by 3 to 5 microns, and the rounded forms 6 to 9 microns. Large forms reaching 20 microns and more, such as have been described in other species, were never seen, but very small forms, measuring only 3 or 4 microns, were sometimes found. The commonest type was a rounded organism about 7 microns in diameter (see fig. 6). A peculiar form not infrequently seen is shown in figs. 1 and 7, in which the organism was expanded laterally in such a way that the breadth exceeded the length, and the flagella appeared to arise near the middle of the body.

The body was enclosed by a delicate periplast that did not, however, prevent the organism undergoing considerable transformations in shape. The cytoplasm contained many refractile granules, especially at the posterior end, and vacuoles containing bacteria and other food materials were common. A contractile vacuole was also present.

In a typical specimen the nucleus was situated a little anterior to the middle of the body, and the kinetonucleus at the anterior end. There was usually a distinct cytostome at the anterior end close to the kinetonucleus and the roots of the flagella. The trophonucleus was large, rounded, or oval, bounded by a well marked nuclear membrane, and furnished with a karyosome. Besides being situated in the anterior half of the body the trophonucleus was often eccentric, being placed nearer to the margin along which the trailing flagellum ran (flagellar margin). In this respect it differed from that of *P. urinaria*, which, according to Sinton (1912), is generally nearer the aflagellar margin.

The kinetonucleus was situated at the anterior end, close to the base of the rostrum when that structure was distinguishable, quite near to or actually in contact with the periplast, and on the aflagellar side of the body. It was a large, sometimes a very large body, that stained with Romanowsky methods a uniform deep red colour, and was rounded, oval, or pyriform in shape. It should be mentioned that a pyriform kinetonucleus, so characteristic of some species of *Prowazekia*, was the exception in the case of this organism.



FIGS. 8-12.—*Prowazekia aquae*, n. sp. to show certain details of structure. × 2,000.

The flagella were two in number, and arose from basal granules close to the anterior end of the kinetonucleus. The one flagellum, the anterior, was directed forwards away from the body; but the other, the lateral, usually ran backwards keeping close to the side of the organism for a longer or shorter distance. This arrangement was not, however, absolutely constant, as occasionally both flagella were directed forwards, and in this case they were usually more nearly the same length. The anterior flagellum generally measured about 9 microns, and the lateral sometimes double this length, but at others considerably less, 13 to 16 microns. There did not appear to be any structure, such as membrane, attaching the flagella to the body. The basal granules were not always easy to see and often appeared as if they were a single body. Sometimes they could not be differentiated from the kinetonucleus.

Multiplication.—The materials examined, containing but few organisms, were not favourable for the observation of multiplication. A few flagellates were seen with elongated bodies slightly constricted in the middle and containing at each end a trophonucleus and a kinetonucleus which somewhat resembled the forms of transverse division described by Sinton, but if they were of this nature they certainly never reached even approximately the sizes occurring in *P. urinaria*. Other specimens were seen in which two short straight rods protruded between the bases of the flagella (fig. 9), and these must, I think, have represented the formation of two new flagella which, according to Sinton, is the first sign of multiplication. Encysted forms were found, some of which appeared to contain flagella, an observation of some importance, as *P. parva*, one of the free-living species, is said to be characterized by the absence of flagella in this stage.

Identification.—To the genus *Prowazekia*, originally founded for a flagellate discovered in human fæces in Brazil, a number of different species have been assigned, namely, *P. urinaria* found in urine, *P. cruzi* and *P. javanensis* found in cultures of human fæces in Brazil and Dutch East Indies respectively, *P. asiatica* and *P. weinbergi* found in the stools of man in Ceylon and Tonkin, and *P. parva*, a free-living form found in the slime on stones at Lunz. The organism described by Walker under the name *Trypanoplasma ranæ* should perhaps be included here, and also that found in tank-water in Calcutta by Chatterjee (1914).

Of these species those that particularly concern us here are the free-living forms, *P. parva* Nägler (1910), and the flagellate described by Chatterjee. *P. parva* is characterized by its small size, 5 to 8 microns, and by the absence of flagella from the cysts; the shape of the body is not invariably oval or pear-shaped, but may be more elongated, and the periplast is not rigid. The organism would appear to be somewhat smaller than the species found at Accra and more commonly elongated. The figures published by Nägler show also that the cytostome and rostrum are much less distinct, that the trophonucleus is less constantly situated eccentrically and in the anterior half of the body, and that the kinetonucleus is generally flask-shaped, as in *P. cruzi*, instead of being rounded.

The organism described by Chatterjee (1914) was found in a sample of water collected from a tank at Calcutta and was cultivated without difficulty in ordinary bouillon and peptone water, and multiplied also in normal saline solution or tap-water. The size and shape of the body varied, and four distinct forms were recognized, namely, fully developed forms 16 to 20 microns in length by 4 microns in breadth, shrunken forms in normal saline solution measuring 11 microns in length, spherical forms about 7 microns in diameter seen in tap-water, and similar but smaller forms only 3 to 5 microns in diameter. This species was, therefore, much larger than the one found at Accra. Chatterjee's organism differed further in the following particulars: the flagella measured only 5 and 10 microns in length respectively, there was said to be a rudimentary undulating membrane, the kinetonucleus was "a larger and more prominent structure than the nucleus," the flagellate could be cultivated easily in nutrient media, and it multiplied most vigorously at blood heat.

Although resembling *P. parva* more closely than any of the other species of this genus the flagellate found at Accra did not completely conform to the description of this organism, and should they prove to be distinct I propose for the latter the name *Prowazekia aquae*. It must be admitted, however, that there is considerable doubt as to the validity of the different species of this genus, and that it is probable that it may be possible to reduce the number, perhaps even to a single species, as the knowledge of these organisms increases.

The Occurrence of the Flagellates.—It is customary to dilute cultures, samples of fæces, &c., before examination; it is convenient for this purpose to keep on the laboratory bench a bottle of normal saline solution, and the stopper of such bottle is sometimes used to transfer a drop of the fluid to the cleaned slide before making the emulsion. This may be a safe and not particularly reprehensible practice in Europe, but in the Tropics it may lead to serious errors. As has been stated above, flagellates of the genus *Prowazekia* flourish at Accra in the necks of bottles of saline solution, and if the stoppers were used to transfer fluid to a slide before making an emulsion of fæces, &c., the flagellates would, of course, be discovered and might lead to erroneous conclusions, for it is in fæces and in cultures of fæces that some of the species of this genus have been found. In the same situations at Accra small actively motile amœbæ with a clear ectoplasm have also been found occasionally. It may not be out of place, therefore, to recount briefly the manner in which my attention was first drawn to these organisms, since it demonstrates the necessity for controlling every stage of even the most simple processes in the Tropics.

Last January (1916), on examining a culture of a fungus I was surprised to find that the preparation showed the presence of numerous flagellates. As it was practically impossible that these organisms could have grown in the culture I concluded that they must have been contaminations introduced with the saline solution used to dilute the materials before examination. The solution used on this occasion had been taken out of a bottle kept on the bench which I remembered had not been used previously that morning, and the drop to dilute the culture had been obtained, as I was in a hurry, by means of the glass stopper. On taking a second drop of the saline solution in the same way it was found to contain numerous flagellates similar to those in the culture preparation.

Occurring as they did as a contamination of a fungal culture these organisms (*Prowazekia*) did not cause any difficulty; but had the infected drop been used to dilute a specimen of fæces it might have led to misconception, because similar flagellates having been previously described as occurring in the human excrement their presence might not have aroused suspicion, or, indeed, might have been hailed as an interesting addition to the intestinal fauna found at Accra.

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A Blood Culture Method with Citrate Broth.—A. Lebœuf and J. Bounafous publish in the *Arch. Méd. et Pharm. Milit.*, vol. lxv, p. 597, an account of a method of blood culture for the enteric group in which, owing to the impossibility of obtaining ox-bile in war time, the following medium was employed: Blood, 2 c.c.; normal bouillon citrate, 10 c.c.; solution of sodium citrate, 10 per cent. 0·5 c.c.

After the addition of the sodium citrate the broth is sterilized and introduced into the tubes. During these experiments an interesting observation was made, viz., that while tubes showing coagulation contained *Bacillus typhosus* and *B. paratyphosus* B, in no instance was *B. paratyphosus* A found in a tube in which coagulation had occurred. The authors added litmus in sufficient quantity to render the medium in the tubes a light violet tint.

The litmus-tinted tubes, when inoculated with typhoid and paratyphoid bacilli, gave the following appearances:—

(1) *B. typhosus.*—In twenty-four hours the colour changed to a rose salmon; in some tubes, after forty-eight, a blue colour appeared; in the majority, however, after seventy-two hours, all the colour was lost, but after a few days the decolorized medium became blue.

(2) *B. paratyphosus* A, after twenty-four hours, the colour assumed a rose-violet tinge which persisted indefinitely.

(3) *B. paratyphosus* B, after twenty-four hours, a dirty grey rose appeared, which rapidly changed to blue, or the specimen lost all colour for a time, and only after some days did the blue colour return.

◆

LONDON SCHOOL OF TROPICAL MEDICINE.

The following list of candidates passed the examination of this School at the termination of the fifty-second session (October-December, 1916):—

Barretto, Fred; Dart, G. H.; Ekanayake, H. E. (Ceylon Med. Ser.); Parsons, L. D. (Ceylon Med. Ser.); Sabnis, R. D.; Sharpe, W. S. (Lieut.-Colonel R.A.M.C.).

The last two years have been years of drought and remarkably healthy, and the numbers treated showed a remarkable diminution.

There were treated during the year fifty-seven police without a death.

J. H. Conyers,
Resident Surgeon.

Public Hospital, Suddie.

All the buildings require attention, this is more so the case in respect to the main one; here many repairs are very necessary. What is absolutely necessary is a hood running the whole length of the East, weather, side. The absence of this, which has been repeatedly asked for, causes much inconvenience, if not danger, to the patients. During heavy rains and strong winds, to which this hospital is exposed, both galleries and parts of the main wards are sometimes flooded, the result being that during such times all the patients are huddled together and the whole place is damp.

The pail system is used, and their contents are buried in trenches to the south side of the hospital.

The grounds around the buildings have been made up and graded towards the drains so that drainage is now more efficient.

The water supply, rain, is ample and good, and the iron tanks in which it is stored are rendered practically mosquito proof.

The conduct of the patients has been uniformly good.

The greatest number in hospital on any one day was seventy-four on April 10, 1913, and the least, thirteen, on November 17, 1913.

The chief diseases treated and the number of deaths were: Malarial fever, 3; enteric fever, 0; pneumonia, 15; dysentery, 3; ankylostomiasis, 7; diseases of kidneys, 15; yaws, 0; filariasis, 0.

Of the 105 deaths during the year forty-eight died within seventy-two hours of admission.

The total number treated in hospital during the year has been 795 patients, and the number of deaths 105, giving a mortality of 13·20 per cent.

There were eighteen births in hospital of which four were still-born.

The out-patients treated were 3,813.

C. F. Castor.

Bartica Hospital.

Extensive repairs were done to the steward's quarters. The central block roof of the Hospital was renewed with corrugated galvanized iron. Minor repairs were done to other parts of this building.

Drainage and sanitary arrangements were good. The water supply has been abundant and good. Dietary, good.

Accommodation: Male ward, 24; female ward, 11.

Statistics.—The greatest number of patients in hospital on any one day was fourteen, on December 13, 1913, and the smallest number was one, on March 19, 1914.

The number of patients in hospital on April 1, 1913, was four males and four females.

The number of patients admitted during the year was 197 males and ninety-six females.

Patients discharged during the year numbered 171 males and eighty-five females.

Died during the year, sixteen males and seven females.

Patients remaining on March 31, 1914, five males and three females.

Of those who died:—

2 died within 12 hours of admission.
3 ,, ,, 24 ,, ,,
1 ,, ,, 48 ,, ,,
1 ,, ,, 72 ,, ,,

The death-rate on the total treated was 7·8.

There were nine births in hospital during the year.

The number of out-patients treated during the year was 380 males and 349 females.

The chief diseases treated and number of deaths were: Malarial fever, 2; phthisis, 0; marasmus, 1; dysentery, 8; convulsions, 2; myiasis, 1; ankylostomiasis, 0; pneumonia, 8; typhoid, 1; other diseases, 0. A total of 293 cases with twenty-three deaths.

A. C. L. La Frenais,
Resident Surgeon.

Public Hospital, Morawhanna.

The accommodation at the Morawhanna Hospital remains the same as in the previous year, namely, for fourteen male and eleven female patients. At the Arakaka Dispensary also the accommodation has been the same as in the previous year, namely, for twelve patients.

The total number of admissions during the year under review was 320 males and 133 females.

From the previous year there remained in hospital five males and three females.

The number of deaths during the year under review was twenty-one males and fifteen females.

The chief diseases treated during the same period were: Malarial fever, pneumonia, heart disease, and ankylostomiasis.

The death-rate on the total number treated was: Males, 6·4; females, 11.

Of those that died within twelve hours of admission, four males, one female; within twenty-four hours of admission, one male, one female; within forty-eight hours of admission, one male, one female; within seventy-two hours of admission, two males, two females.

During the year under review the nursing of the patients was on the whole satisfactory.

There were seventeen cases of confinement.

There were 3,203 cases treated as out-door patients during the year.

The daily average number of in-patients treated during the year: 10·12 males; ·37 females; total 10·49.

The building is in good condition, some minor repairs were carried out during the year under review, and the outside painted.

was stigmatized as being old-fashioned and out of date—a justifiable epithet. Yet what do we see to-day at the Front? Septic wounds in plenty, not caused by the surgeon or by defective drains, but by the exigencies of war, where even motor carriage and hospitals close to the firing line cannot prevent delay in many instances in bringing the wounded man to the surgeons so that sepsis can be prevented. A plethora of sepsis prevails on all fronts of both the Allies and the enemies, and the question of the hour is how to prevent this occurring and how to treat sepsis when it occurs.

The occurrence can only be prevented by yet more rapidly bringing the wounded man under treatment, a condition of things greatly to be hoped for, but difficult of accomplishment when a savage enemy prevents the wounded being removed from No Man's Land, where they may lie for days at times, only to be rescued under a hail of shot. To treat the septic wounds met with there are two schools of thought: by one the assiduous use of disinfectants in an attempt to destroy the pathogenic organism within the wound is practised; by the other, the principle of removing the discharge as soon as it is formed. The former school—that which relies upon destruction of organisms within the wound—has been a failure. It is found that wiping out the infected wound with a strong disinfectant is useless, and has been, moreover, placed under the ban of being unscientific. The "removal of discharge" school is in the ascendant, for it is held that, as it is impossible to eradicate bacteria from an infected wound, it is best to wash the products away as soon as formed, so as to prevent toxæmia due to the decomposition of these products being absorbed in the system. In fact, the surgery of the day is imitating the surgery of forty years ago when the "drip" was in vogue, when iodine is supplanting carbolic, as in the seventies carbolic supplanted iodine. A surgeon of the seventies come to life again, and visiting our hospitals for wounded soldiers, might say, "I see you are continuing the practice of washing away the discharges from wounds by the 'drip,' and that iodine still holds sway." It may be that the reversion to former practice is correct. Yet it is not what was anticipated at the commencement of the War, when modern surgery was expected to show its marked superiority over all records in the long history of warfare. Have we reached finality, or shall we discover a new or improved surgery as far as sepsis is concerned? Let us hope so. As the Crimean War in 1854 gave us a Parke and modern hygiene; as the result of Cohnheim's visit to Stricker in Vienna after Sadowa in 1868 was the discovery of the escape of the white blood corpuscle through the capillary walls and gave us modern pathology; so let us hope this Great War, with its barbarities and terrible toll of life, may give us new facts in both surgery and medicine whereby the living may be succoured and posterity benefited.

Annotations.

Technic Rapid Vaccinations (Camus, *Bulletin de l'Académie de Médecine*, October 17, 1916).—Although a single pustule confers immunity as well as six pustules, yet the interval before the immunization is complete is much longer when a small dose of vaccine is used than when a large dose of an extra active vaccine is used. In time of epidemics the activity of the vaccine is extremely important, and possibly also the number of inoculations, as it is necessary to hasten the immunization.

Laboratory Diagnosis after Vaccination against Typhoid (A. Demolon, *Paris Médical*, October 21, vi, No. 43).—The typhoid bacilli linger only a very short time in the blood of a vaccinated subject. The best culture medium for them seems to be bile, using twice as much bile as of the blood. If a polyvalent vaccine is used, there is liable to be coagglutination of the three strains, but the one involved is agglutinated more intensely and more rapidly than the others.

Phosphaturic Leg Ulcer simulating Gumma (P. F. Arullani, *Riforma Medica*, xxxii, No. 32).—The differential diagnosis was obtained by exclusion of syphilis, tuberculosis, &c., by clinical and bacteriologic tests, and by negative inoculation of animals, and there was nothing to suggest hysteria. The blood findings were normal and the urine was free from albumin and sugar, but it contained large amounts of phosphates. This phosphaturia with the polyuria and polydipsia suggested Teissier's "phosphatic diabetes," and treatment soon cured the patient. Under tonics and large doses of phosphates the ulcer healed, the general health improved, and strength was regained.

Joint Hypotonia (Finkelstein, *New York Medical Journal*, November 11, 1916).—The characteristic feature is a striking degree of joint mobility involving practically all the joints of the body without apparent demonstrable muscle weakness. It is not only congenital, but familial as well. There is no interference with the motor power, not even a weakening of the muscles, nor is there any loss of reflexes. The electric reactions are normal. Nearly all the joints of the body are involved. The röntgenogram shows no evident lesions in the bones. The only structures affected are the capsules and ligaments of the joints. The prognosis, judging by the progressive improvement which occurred in the other affected members of the family is favourable. This is the only case of its kind that has come before the author's observation in a decade, and no similar instance has been cited in the literature.

Suprarenalitis in Malaria (G. Paisseau and H. Lemaire, *Bulletin de l'Académie de Médecine*, October 17, 1916).—In the course of three cases of pernicious malaria a syndrome indicating acute insufficiency on the part of the suprarenals was noticed: extremely low blood-pressure without changes in the heart rhythm, vomiting, diarrhœa, lumbar and abdominal pains, extreme weakness and white dermographism. Necropsy revealed advanced degeneration in the suprarenals and local hæmorrhages and, in one, foci of necrosis. The malarial parasite was found in the suprarenal tissue. It is probable that the suprarenal syndrome occurs in malaria more often than generally recognized. Epinephrin, to combat it, may be indicated in all cases of malaria, even the simplest forms, when the symptoms suggest possible insufficiency on the part of the suprarenals.

Chauffeur's Fracture (S. A. Maximovich, *Russkiy Vrach*, xv, No. 36).—The four varieties of chauffeur's fracture (radius) resulting from the blow of the crank vary with the age of the subject. In four, who were 19 or 20, the epiphyses were merely separated. In two, 25 and 26 years old, the fracture was of the classical type resulting from a fall on the wrist, with fracture of the styloid process of the ulna. In fourteen the men were all over 23, and in each the epiphyseal line, although consolidated, was evidently a point of lesser resistance, particularly at its outer end, and the bone split here, a triangular piece being pried off. In the other cases there was separation of the epiphyses with partial fracture of both bones above. Some of the cases had had no treatment and had healed with considerable callus and the movements of the wrist were difficult and painful, emphasizing the necessity for immobilization, massage and exercise as for other fractures.

Serum Treatment of Weil's Disease (Inada, Ido and others, *Journal of Experimental Medicine*). The authors first employed serum from recovered patients and later serum obtained from actively immunized horses. As human convalescent serum is not procurable in large quantities, a horse was immunized with *Spirochæta ictero-hæmorrhagia*. Of the thirty-five patients who received the serum treatment, seven died. The mortality of Weil's disease in Japan is from 30 to 48 per cent. In view of the reduction in the mortality rate, the authors claim that the administration of the serum has a marked effect in Weil's disease. With rare exceptions the serum destroys completely the spirochætes contained in the circulating blood. The development of antibodies is promoted by the serum injections. The number of spirochætes in the organs is reduced by the treatment. Secondary manifestations due to the serum are slight and disappear promptly. The ultimate effects of the serum treatment on the symptoms and final outcome of the disease have still to be determined.

Reinfection and Immunity in Tuberculosis.—Reiche (*Medizinische Klinik*, October 1, xii, No. 40) analyses the findings and family history in 6,000 adult tuberculous insured whom he has examined since 1895. The family history was known in 4,931 cases, and there was no history of tuberculosis in 66·5 per cent. In the others, namely, in 33·5 per cent., one or both of the parents had been a consumptive. This percentage was 29·3 for the 1,012 men, and 43·4 for the 639 women. Among 7,860 non-tuberculous adults from the same social strata a history of tuberculosis in the parents was found only in 15 per cent. These and similar data are discussed from various standpoints, Reiche's conclusion being that repeated reinfection is more probably responsible for pulmonary phthisis in adults than autoinfection from an old latent tuberculous process. The former assumption seems to be the only possible explanation for the preponderance of women over men, and also for the larger proportion of cases in which the father had been tuberculous, rather than the mother. Women, as stay-at-homes, are more exposed to familial infection, while the tuberculous, smoking father, spitting and coughing, is more liable to disseminate contagion than the more careful mother.

Syphilis without Chancre (Gaucher, *Bulletin de l'Académie de Médecine*, October 17, 1916).—A chancre is only the reaction of the epidermis to inoculation with the virus of syphilis, if the inoculation occurs by some other route, there is no reaction on the part of the epidermis. Four such cases are described. In two the infection occurred at laparotomies. My assistant had syphilitic lesions in the mouth at the time. In another case infection occurred when the surgeon cut his finger at an operation on a syphilitic, and in a fourth case from an injection made with the same needle that had just been used on a syphilitic whose disease had not been recognized. Likewise the uterine wall is infected, while the intact external genitals escaped. The syphilis thus transmitted to the woman may run a latent course for years. In one such case gummas on the legs were the first signs of trouble, thirty years after infection had presumably occurred in this way. The husband's syphilis dated from ten years before his marriage. Other women in this category have leukoplakia of the tongue as the first manifestation of infection, one tabes, another sclerosis in patches. In a total of ten such cases, the circumstances rendered it almost positively certain that the women had been inoculated in the uterine mucosa outside of pregnancy.

New Bacilli to Combat Pathologic Intestinal Flora (Nissle, *Deutsche medizinische Wochenschrift*, September 28, xlii, No. 39).—When specimens of stools from different persons are inoculated with typhoid bacilli the bacteriologic findings later differed widely. In some the typhoid bacilli proliferate luxuriantly, in others not at all. This divergence in results is due to the differing power of the natural colon bacilli to combat and annihilate the added typhoid germs. He isolated colon bacilli from different specimens of stools, and compared their behaviour in respect to typhoid bacilli. Tubes of bouillon culture medium were inoculated with a loop of a bouillon culture of typhoid bacilli and incubated at 37° C. (98·6° F.) for seven hours, and then inoculated with the colon bacillus strain and incubated anew for fourteen hours. After this, Endo plates were prepared with the diluted mixture. The next day 100 or 200 well isolated colonies were counted. The ratio between the colon and typhoid colonies is calculated for 100 colon colonies. It shows the capacity of the individual strain of the colon bacillus to crowd out the typhoid bacilli. One strain may present a ratio of 100 : 500, another 100 : 20. The ratio of the power of these two strains would therefore be 1 : 25. The extremes found were 100 : 4,050 and 100 : 3.

Study of the colon colonies revealed further that the strains producing more lactic acid gave the highest ratio. When the ratio was high against typhoid bacilli, the colon bacilli were also highly antagonistic to other strains of colon bacilli. The lowest ratio in numerous experiments was found in eight cases of chronic typhoid bacilli carriers. Repeated tests confirmed the constancy of this phenomenon, the index ranging always from 100 : 200 to 100 : 4,050. The highest index was found in some paratyphoid cases of exceptional mildness. The logical consequence of these findings is to apply them in treatment, giving patients with inefficient colon bacilli others from other persons with high antagonistic index. The alien colon bacilli were given in capsules, and in eleven clinical cases this treatment was systematically applied. In four the intestinal flora was normal and no benefit was apparent, but in seven cases of paratyphoid, typhoid, or streptococcus intestinal trouble the bowel flora returned to normal. The treatment seems thus to have proved its usefulness, and offers a prospect of successful prophylaxis for persons exposed to danger of bowel infections and to prevent development of carriers. The new born might be treated in this way to ensure them a highly antagonistic strain for life, thus warding off their being taken possession of by a weakly antagonistic strain. It is possible that this same principle might apply to superficial infectious processes and those of other internal organs.

Abstracts.

RELATION OF DIET TO BERIBERI.[1]

By G. B. Vedder.

A great step was made when Fraser and Stanton showed that the protective substance was dissolved out of rice polishings by a 0·3 per cent. hydrochloric acid solution, and remained in solution even when sufficient alcohol was added to precipitate out the phytin. Chamberlain and Vedder then showed that the protective substance was water soluble, alcohol soluble, but insoluble in ether, that it was dialyzable, absorbed by animal charcoal, and that an extract of rice polishings containing only those substances soluble in both water and alcohol would cure infantile beriberi with marvellous rapidity. With the exception of the demonstration that infantile beriberi was curable by an extract of polishings, the work referred to above was all based on feeding experiments in which various extracts or substances obtained from rice polishings were administered to fowls subsisting on a diet of polished rice, and in which the *protective* power of the extracts was determined.

At this point Funk succeeded in obtaining from rice polishings a crystalline base which would promptly cure fowls that had already developed polyneuritis. Funk believed that he had succeeded in isolating this substance in a state of chemical purity, that it belonged to the pyrimidin group, and he even gave it an empiric formula, and coined the name "vitamin" for it. Vedder and Williams found that, using Funk's method, they were able to obtain a crystalline substance which promptly cured fowls, but they were unable to obtain a sufficient quantity in pure form to subject it to accurate chemical analysis. At about the same time, Edie and his co-workers obtained a similar curative substance, but gave it a different formula. The careful chemist who reads these papers might come to the conclusion that the very existence of such a substance as the so-called vitamin was doubtful. However, the fact that such a substance exists is as well proved as any natural fact can be. All of the foregoing investigators have succeeded in obtaining from rice polishings a chemical substance which in doses of a few milligrams was capable of curing birds suffering with polyneuritis induced by a diet of overmilled rice. But it is now evident that these investigators, and particularly Funk, were a little premature in announcing the chemical formula of the pure vitamin. Evidently none of them were working with pure vitamin, a fact which was admitted by Drummond and Funk in a later article, who there state that they cannot isolate the pure vitamin, but that it is apparently decomposed during the fractionation and that all trace of it is lost. It should therefore be plain that while Funk's work gave a tremendous impetus to this investigation, neither he nor any of the foregoing workers succeeded in isolating pure vitamin, and that its chemical formula remains unknown. Williams[1] succeeded in preparing, synthetically, substances that would cure polyneuritis in fowls. These substances display a remarkable dynamic isomerism which has a most profound influence on their antineuritic properties. The curative form of each compound readily undergoes at ordinary temperature a re-arrangement of its atoms resulting in the formation of a physiologically inert substance. By the application of dry heat, the non-curative form can be readily reconverted into the curative one. Although the synthetic substances in which this physiologically important isomerism was first discovered were hydroxypyridins, it now seems possible that the antineuritic properties are not peculiar to them, but are inherent in the type of isomerism of which they are capable. Later unpublished work of Williams and Seidell has furnished further evidence that a similar isomerism exists in the vitamin of yeast, and is primarily responsible for the instability of these compounds which has so far prevented their isolation.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, November 18, 1916.

[1] "Williams, R. R.: "On the Chemical Nature of the Vitamins," not yet published.

The substance isolated from yeast which appears to display this isomerism is the well-known purin base adenin. Just how narrowly defined the group of naturally occurring substances of this type may be remains for future investigation. Nothing is yet known as to the exact identity of the vitamin as it occurs in rice polishings or as to the chemical relation existing between vitamins obtained from various sources.

It is quite evident that this work indicating the importance of isomerism affords an idea which is quite as new and startling as the conception of the vitamin was three years ago. The study of dietetics from the point of view of the vitamins has only just begun, but it is evident that there are many of these accessory food substances which play an important rôle in metabolism, and that this fact must be taken into account in planning diets in institutions, and in interpreting the relation of diet to such diseases as pellagra.

The exact rôle which these vitamins play in metabolism has not yet been elucidated, and any opinions which have been expressed must be in the nature of tentative hypotheses. With regard to the antineuritic vitamin, I have proposed the hypothesis that this chemical substance acts as a building stone of the complex structure of the nervous tissue, without which it cannot be repaired. When a deficiency in this vitamin exists, the nervous tissne becomes first exhausted and then degenerated, until finally the symptoms of polyneuritis appear in fowls or dry beriberi in man. This theory is based on experimental observations. Thus Vedder and Clark found that the mitochondria in the nerves of fowls showed definite changes after only seven days on a diet of polished rice, and long before the fowls showed any clinical symptoms of polyneuritis, and these changes were progressive the longer the deficiency lasted until evident degeneration could be demonstrated. Chromatolysis and changes in the nigroid substance of the cells of the cord, similar to that observed in pigeons which have been exhausted by long flights, may also be demonstrated in birds which have developed polyneuritis.

More recently Funk and Braddon and Cooper[1] have published experimental work indicating that the antineuritic vitamin is concerned in some way in carbohydrate metabolism. This conclusion is based chiefly on the fact, which they claim to have demonstrated, that the rapidity of the onset of polyneuritis depends on the amount of carbohydrate eaten. In other words, if a definite but deficient amount of antineuritic vitamin is furnished, the fowls receiving 100 grm. of rice daily will develop the disease sooner than the fowls receiving 50 grm. of rice daily. This observation seems erroneous. It is sufficient to state that fowls will develop polyneuritis on diets containing absolutely no carbohydrate, such as exclusive diets of sterilized egg, or sterilized meat. In the light of this fact it is difficult to understand how the vitamin can be concerned in carbohydrate metabolism. The antineuritic vitamin is the only one of the accessory food substances concerning which there is sufficient evidence to even theorize concerning its action in the body, and it is certain that much more experimental work must be performed before we shall have any adequate conception as to the physiologic action of the vitamins.

The study of beriberi, scurvy and other deficiencies has led us to a working hypothesis that there are a number of different accessory food substances or vitamins and that each deficiency disease is caused by the absence of its particular vitamin. The question may naturally be asked, Why assume the existence of so many vitamins in our present state of ignorance concerning the chemistry of these bodies? May it not be a single substance acting differently under different circumstances and in different animals? I have elsewhere stated the reasons which lead me to believe that dry beriberi and wet beriberi in man are caused by the deficiency of two distinct though possibly chemically related vitamins. With regard to scurvy it may be pointed out that men or monkeys fed on rice will develop beriberi, but if fed on bread will develop scurvy. It seems reasonable to suppose that there must be two vitamins concerned, the deficiency of one producing scurvy and deficiency of the other producing beriberi, and that the scurvy preventing vitamin is present in rice. Further, Funk and McCallum[1] and others have shown that diets which produce neither beriberi nor scurvy in rats may still be deficient in accessory food substances so that young rats are unable to grow on them. Indeed, McCallum and Davis[2] have shown that this failure to grow is due to the deficiency of two substances, one water soluble and one soluble in butter fat, both of which must be present before growth can proceed. From all of these facts and many others, it seems that we must assume that there is a whole group of accessory food substances or vitamins, and that further investigation will be necessary to determine the relation of these various substances to each other.

Much criticism has been expended on the term "vitamin." Most of this criticism is from chemists who point out that the termination "amin" indicates a definite chemical structure, and that since the chemical structure of these accessory food substances is not definitely known, the term is probably a misnomer. To me this appears a splitting of hairs. Perhaps the term is not chemically exact, but neither is the use of the word "vaccine" etymologically correct. Most vaccines have nothing to do with a cow. The term "vitamin" is simply a convenient expression to use in place of the elaborate phrase "accessory food substance," and it will probably continue to be used because of its convenience. Vitamins are certainly necessary to life, and to that extent the term is etymologically correct and expresses a fact in one word which is lacking in the phrase "accessory food substance."

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[1] Braddon and Cooper: "The Influence of Metabolic Factors in Beriberi," *Journ. Hyg.*, 1914, xiv, p. 331; *Brit. Med. Journ.*, 1914, i, p. 1348.

[1] Funk and McCallum: "Studies on Growth," *Journ. Biol. Chem.*, 1915, xxiii, p. 413, &c.

[2] McCollum and Davis: "The Nature of the Dietary Deficiencies of Rice," *Journ. Biol. Chem.*, 1915, xxiii, p. 181.

Finally, I wish to discuss briefly the application of some of the information obtained with regard to beriberi and scurvy, to other possible deficiency diseases. The deficiency in the dietary that causes beriberi is not by any means limited to rice, for it has been shown repeatedly that too exclusive diets of ordinary white flour, canned goods that have been sterilized, and most carbohydrate foods, such as sugars and starches, tapioca, sago, hominy and certain kinds of cornmeal will produce polyneuritis in fowls and beriberi in man. Beriberi has been reported repeatedly in communities, asylums, prison camps, &c., where the diet has consisted largely of such foods. For this reason we may expect to find the disease more often than is generally supposed in the United States, and Wood[1] has recently reported the presence of beriberi in Carolina. It may be of interest to note that Jürgens[2] has recently reported what is probably wet beriberi in the prison camps of Europe, but describes it as the œdema disease.

Rice, so far as known, has not been shown to produce scurvy in man or animals, but with this exception practically all of the articles named above have been definitely associated with outbreaks of scurvy. Salted meats are also notorious scurvy producers. Thus a diet of hard bread and bacon has often produced scurvy among soldiers when fresh vegetables and fruits were inaccessible, and similar diets produced scurvy with great regularity among sailors on long voyages before the compulsory use of lime juice.

It is noteworthy that where pellagra is prevalent in the United States, the sufferers from that disease are living very largely on articles that have been demonstrated to produce either beriberi or scurvy or both, namely, flour, cornmeal, canned goods, salt meat, &c. It is quite possible that these people have been protected from scurvy and beriberi because they have eaten a sufficient quantity of other foods that protected them against those diseases, such as fruit and beans, but left them susceptible to a third deficiency that produced pellagra. Dietary deficiency as a cause of pellagra has been dismissed summarily many times, simply because the investigator was ignorant of or misinformed with regard to the facts that the study of beriberi has developed.

For instance, it is obviously absurd to assume that pellagra must be an infection or an intoxication because of its peculiar pathology. The generations in the nervous system in pellagra resemble certain known intoxications, but so does the degeneration of the nervous system in beriberi. Indeed, because of this fact, beriberi was for many years supposed by some to be an intoxication. It is hard to believe that the profound changes seen in the bones in scurvy can be due to the deficiency of any substance found in fruit juices, yet it has been proved that this is the case.

Again, if pellagra is a deficiency disease it has an extremely long depletion period. If Goldberger and his associates produced pellagra in their human feeding experiment, the depletion period on the diets used may be placed at at least five months. This long period that must elapse between the adoption of a deficient diet and the appearance of pellagra may easily mislead us in the interpretation of epidemiologic data, and it makes it very difficult to find a suitable experimental animal in which pellagra may be produced, for the simple reason that many animals, fed on presumably pellagra producing diets, will die of some other deficiency disease. I have myself fed four monkeys on diets similar to those observed among pellagrins, but these monkeys all died of scurvy.

The errors and pitfalls into which an observer may fall in trying to elucidate a deficiency disease are many, but for the future it will not be disputed that the investigator of pellagra should be fully informed with regard to the literature on other deficiency diseases.

CONCLUSIONS.

As there are many conditions under which it is difficult for certain people and institutions to procure a rich and varied diet, I should like to repeat and emphasize the simple dietary rules which I have formulated for the prevention of deficiency diseases:—

(1) In any institution where bread is the staple article of diet, it should be made from whole wheat flour.

(2) When rice is used in any quantity, the brown undermilled, or so-called hygienic rice, should be furnished.

(3) Beans, peas or other legumes, known to prevent beriberi, should be served at least once a week. Canned beans or peas should not be used.

(4) Some fresh vegetable or fruit should be issued at least once a week and preferably at least twice a week.

(5) Barley, a known preventive of beriberi, should be used in all soups.

(6) If cornmeal is the staple of diet, it should be yellow meal or water-ground meal, that is, made from the whole grain.

(7) White potatoes and fresh meat, known preventives of beriberi and scurvy, should be served at least once a week, and preferably once daily.

(8) The too exclusive use of canned goods must be carefully avoided.

The strict application of these rules will eradicate scurvy and beriberi, and I belive that they would be equally efficacious in eradicating pellagra.

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[1] Wood, E. J.; "The Question of the Existence of Beriberi in the United States," read before the Association of American Physicians, May 9, 1916.

[2] Jürgens: "Œdema Disease among Prisoners of War," *Berl. klin. Wochenschr.*, February 28, 1916.

THE CONTROL OF RAT PLAGUE.[1]

By William Wright, M.D., D.P.H.
Deputy Medical Officer of Health for Glasgow.

The ideal method of ensuring absolute safety against rat infection ship-borne is obviously that of destroying every rat on every vessel arriving at a home port from an infected one. I am not aware that such drastic measures have ever been employed at any port in these islands, nor do I consider the immense outlay it would involve necessary. At the same time it is worth remembering that even one infected rat ashore is capable of starting an epidemic. Taking that into consideration, then, in view of the measures which are usually adopted, we must acknowledge that we have escaped possibly more by good fortune than by good guidance. What are the measures usually adopted? Under the Cholera Order when a vessel on which an unusual mortality amongst rats has occurred—in other words, where a number of rats have been found dead from no accountable cause—that vessel is regarded with suspicion and means are adopted to destroy all rats on board. The "Clayton" apparatus is requisitioned, and by this means sulphur vapour is pumped under pressure into the holds. Similarly in some ports where it has been reported that a vessel is infested with rats, the "Clayton" is employed. But all ports—not even all the larger ports—are not provided with "Clayton" apparatuses. Again, some of those ports so provided use them only occasionally. I am aware that some of the larger vessels are equipped with this apparatus, but those who have been to sea may be able to say whether the average ship's officer, as a rule, takes much interest in it. It is asserted that by the use of the "Clayton" every rat in the hold is destroyed. I offer no opinion in this respect, but on more than one occasion in Glasgow we have found live rats in vessels within a day or two of their being so treated. At the same time the "Clayton" is the most efficient machine for destroying rats in bulk that we possess to-day. It is difficult to believe that every rat can be destroyed in a vessel fully laden with cargo. Moreover, holds do not comprise the whole of the ship. The lazarette, the forecastles, state rooms, and engine rooms, in fact, the whole ship, should be fumigated. Rats have been trapped in many places on board ship. From the bacteriological standpoint, further, it is not only necessary to kill every rat, but every flea and *Bacillus pestis* if possible. The following example of a case of plague, related in the Annual Report of the Medical Officer of Health, Glasgow, which occurred on a vessel in Glasgow on May 30, 1911, where few rats, if any, could have been on board, serves as a good illustration in showing that, despite all efforts, plague may still occur.

History of Voyage.—The vessel left Glasgow on February 11, 1911, and went via Liverpool, Port Said, Suez and Bombay to Kurrachee. The return voyage began on April 8, and the vessel reached Port Said on 19th and Marseilles on 25th of the same month. She had remained at Bombay for ten days, and at Kurrachee for fourteen days, but left Suez and Port Said on the day of arrival. While recognizing that Suez and Port Said are at intervals infected ports—an odd case occasionally occurring there—in view of the short stay of the vessel and the fact that she did not lie alongside the quay at these ports, one may reasonably presume that infection was conveyed to the vessel either in Bombay or Kurrachee, both of which ports were at the time and still are infected. I repeat that the vessel lay ten days at Bombay and fourteen days at Kurrachee. This point is worth emphasizing. The last date of possible infection to the vessel was, therefore, April 8. The case—a Lascar, aged 25, and a native of Calcutta—sickened first on May 28. An interval, therefore, of fifty days elapsed, namely, from April 8, when the vessel last lay at an infected port, and the onset or symptoms of plague in a human being. I will refer to this later. The vessel, in continuing her voyage homewards, remained at Marseilles for three days, and during this time the holds were disinfected by a "Clayton" machine. The officers of the ship were uncertain whether the "Clayton" had been used to introduce sulphur vapour or carbon monoxide, but the former would seem more probable, as the officers stated it smelt badly. Leaving Marseilles on April 28, the vessel arrived at Liverpool on May 5, crossed to Birkenhead on May 9, and left for Glasgow on the 12th, reaching the Clyde on May 13. None of the crew were allowed to go ashore at Port Said or Suez, and they were only allowed on the wharf at Marseilles. When sailing up the Clyde on May 13, the ship was in collision with another vessel, but was able to complete her voyage; on the same day, arrived at Queen's Dock, Glasgow, where she lay for three days. On May 16 she was transferred to the Graving Dock, Govan, on the south side of the river. The patient's sickness did not begin until May 28, that is, on the fifteenth day after the ship had reached the Clyde, and, as before stated, fifty days after leaving Kurrachee. On her admission to the Graving Dock the repairs necessary required the removal of a large part of the plating of the vessel from the keel upwards on the port side forward. The extensive character of the repairs before the sickness began, and the nature of the work necessary being accompanied by so much hammering, &c., would of themselves have driven rats from the ship had there been any on board on reaching the Clyde. On this point, however, the European officers were quite definitely of opinion that no rats had been seen. Further, no rats were found after disinfection. Twenty-six rats were obtained at the Graving and Queen's Docks, three of those belonging to the species *M. decumanus*, and twenty-three to *M. rattus*, but on examination all proved negative.

Source of Infection.—With no other illness suggestive of plague during the voyage, and the absence of rats on board, the source of infection still re-

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[1] Abstracted from the *Journal of State Medicine*, December, 1916.

LONDON SCHOOL OF TROPICAL MEDICINE.

52nd Session. Oct.—Dec., 1916.

ront Row (*Sitting*).—Mr. T. H. Vaughan (*Dental Surgeon*), R. T. Leiper (*Helminthologist*), Dr. G. C. Low (*Lecturer*), H. B. Newham (*Director*), Col. A. Alcock (*Entomologist*), W. S. Sharpe, Lt.-Col. R.A.M.C.

Iiddle Row.—Maud (*Laboratory Girl*), Louise (*Laboratory Girl*), Dr. W. G. Ridewood, F. Barretto, R. D. Sabnis, L. D. Parsons, E. B. Garrard, R. P. Cockin (*Entomological Assistant*), Emma (*Laboratory Girl*).

ack Row.—J. S. Bryne (*House Surgeon*), H. E. Ekanayake, G. B. Warren (*Laboratory Assistant*), S. C. Biswas (*House Surgeon*), Robert (*Laboratory Assistant*).

bsent.—G. H. Dart, J. G. Thomson (*Protozoologist*).

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CONNAUGHT ROAD, ALBERT DOCKS, E.

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LONDON SCHOOL OF TROPICAL MEDICINE.

53rd Session. January—April, 1917.

Front Row (Sitting).—R. T. Leiper (*Helminthologist*), H. B. Newham (*Director*), Dr. C. W. Daniels (*Lecturer*), Lt.-Col. J. J. Pratt, I.M.S. (*Lecturer*), Lt.-Col. A. Alcock (*Medical Entomologist*), P. Michelli, C.M.G. (*Secretary*), Miss Hanbury (*Assistant Librarian*).

Middle Row.—G. B. Warren (*Laboratory Assistant*), R. R. Syquia, P. L. Manuel, J. T. Jungalwalla (*House Surgeon*), S. C. Biswas (*House Surgeon*) R. S. Taylor, R. P. Cockin (*Assistant Entomologist*), A. C. Douglas.

Back Row.—Robert (*Laboratory Assistant*), Louise (*Laboratory Girl*), T. P. Woo, E. Pereira da Silva, Nellie (*Laboratory Girl*), Maud (*Laboratory Girl*).

Absent.—H. Fukushima, J. H. H. Pirie, Miss A. Borrow, J. G. Thomson (*Protozoologist*).

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S

D.

LONDON SCHOOL OF TROPICAL MEDICINE.

54th Session. May—July, 1917.

Back Row.—Amelia (*Laboratory Girl*), Robert (*Laboratory Assistant*), Nellie (*Laboratory Girl*).
Middle Row.—H. Fukushima, M. Dia, P. A. Dingle, D. T. Birt (*House Surgeon*), G. B. Warren (*Laboratory Assistant*), P. M. Antia, S. C. Biswas (*House Surgeon*), R. P. Cockin (*Assistant Entomologist*), Louise (*Junior Laboratory Assistant*).
Front Row.—Miss S. Dolmer, R. T. Leiper (*Helminthologist*), P. Michelli, C.M.G. (*Secretary*), Capt. G. C. Low, I.M.S. (*Lecturer*), Lt.-Col. A. Alcock, I.M.S. (*Medical Entomologist*), Miss Hanbury (*Assistant Librarian*), H. B. Newbam (*Director*).
Absent.—M. Erfao.

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mained unascertained. Our recognized methods of dealing with plague, in view of the occurrence of this case, under the circumstances received a severe shock, and opened up a path of thought to those who have devoted much time to the subject in seeking some other channel of infection yet unrecognized. A suggestive statement made by Dr. D. T. Verjbitski, of the Laboratory of the Emperor Alexander I., St. Petersburg, may help to explain. It is to the following effect: "In the case of linen and other fabrics soiled by crushing infected fleas and bugs on them or by the fæces of these insects, the plague microbes can, under favourable conditions, remain alive and virulent during more than five months."

Immunity of Rats.—In the seventh report on "Plague Investigations" (*Journal of Hygiene*, Plague Supplement II, January, 1913, p. 231), it was shown that "83 per cent. of Madras rats" following inoculation "died of plague," whereas "only 44 per cent. of Bombay and 30 per cent. of Poona rats succumbed to the disease." Similarly it was proved, when the disease was propagated among the rats by infected fleas, "that Poona and Bombay rats were relatively to Madras rats highly immune to infection." Madras city has been free of plague except for one small outbreak in 1905, whereas Bombay and Poona suffer severely from plague. The inference to be obtained from these series of carefully conducted experiments is that immunity has, in great part by long contact with infected animals, been established among rats in areas where plague has been prevalent for years, and consequently Port Local Authorities in this country need not entertain the same fear of infection from vessels arriving from ports in such areas. In other words, contrary to the usual practice here, more vigilance should be given to vessels arriving from ports only recently affected than those arriving from ports where the disease has been prevalent for a long time. For years Glasgow has employed a rat-catcher at the Docks, and during 1913, 657 rats were obtained from on board ship and 213 from the docks, all proving negative on examination.

In conclusion, I will shortly refer to the methods usually employed at ports in preventing rats from getting ashore. Rat-guards are of two kinds: (*a*) Sheet iron discs, preferably 20 to 24 in. in diameter; (*b*) brushwood guards applied likewise to the ropes, but with the points facing in the direction of the ship. Sometimes the ropes are tarred in part of their length, but ships' officers object to this, and tarred canvas wrapped round the ropes is employed instead. The gangways are also tarred or whitewashed 2 ft. at either end, the whitewashing being preferred. Two fallacies enter into the efficacy of all these measures: (1) Although the harbour regulations require that all stevedores' gangways should be withdrawn when the work of loading ceases for the day, this is seldom given effect to. (2) In tidal harbours the depth of the vessel is often level with the dock four times in the twenty-four hours. I am satisfied that rats frequently find their way ashore despite all precautions taken.

Drugs and Appliances.

JEYES' SANITARY COMPOUNDS COMPANY, LTD.

"JEYES' FLUID" is perhaps the best known and most widely used disinfectant in the British Empire. It is no mere ephemeral compound, for it has been before the public for forty years. Its potency as an antiseptic and insecticide is undoubted.

Besides Jeyes' Fluid the firm supply several preparations, derived from the original fluid in some instances, and passing under several names.

Cyllin, claimed to be the strongest known germicide, is met with as "Jeyes' Special Fluid Cyllin"; it is less toxic than Jeyes' Fluid to the higher forms of life, and is found to be eighteen to twenty times the germicidal strength of pure carbolic acid. Medical Cyllin is non-irritant, and is used for wounds of every description.

Cyllin Capsules, used in both stomachic and intestinal ailments, are a well-known medicament.

"Cresol," the scientific term used for what is commercially known as cresylic acid, is largely used in many spheres, but in none more markedly than in military camps at home and abroad. The "Liquor Cresoli Saponatus" so commonly referred to in military writings, is merely a scientific expression insisted upon by the War Office authorities for Jeyes' Fluid, and anyone familiar with medical affairs at the Front is aware of the implicit confidence placed in this preparation. No less than 1,130,000 gallons had been supplied for Army use (up to some months ago), since the commencement of the War, and the demand is increasing amain.

The firm that introduced the Rideal-Walker (bacteriological) method of test for disinfectants is not likely to make mistakes in regard to the potency and stability of their products. All their preparations can be, and are, tested by this method, and there is no whisper of unreliability in connection with any of the preparations issued by this great firm.

"ZOEL," an antiseptic introduced by the "Zoel" Co., 29, Charing Cross, London, S.W., is stated to be a monoborate compound. Borax—a diborate—has long been viewed askance as an antiseptic, and whether for internal use, for washing out the intestine or for external use its potency is justly despised. With the advent of a monoborate, however, a new and hopeful aspect has developed. It is, moreover, alkaline to a slight degree, a quality which recommends it, for it would appear that alkaline substances, such as potashes, which largely consist of alkaline salts and chiefly carbonate of potash, is a time-honoured application to freshly made wounds. It may be that recently burned straw, wood, or leaves, being sterile, is a factor by which the advantage obtains, but when we look further afield we find that alkaline substances are agreeable agents for application to the skin, whether we regard it in burns or scalds, when limewater, either plain or mixed with oil or linseed oil (carron oil), is ever grateful and widely used. Soap itself is a mixture of oil and alkalies.

Internally there can be no doubt, as the action of saliva—an alkaline fluid—proves, an injury to the tongue healing more quickly than any other wound; the hole left after extraction of a tooth disappears practically after twenty-four hours. So that alkalinity in an application is a recommendation, and for that reason alone we welcome the alkaline monoborate "Zoel."

We have long asked the chemists for an alkaline ointment, and it is to be hoped that the "Zoel" Company will give us one.

We hope also that "Zoel" may be capable of being incorporated with lint, cotton wool, &c., so that we may have "Zoel" lint, cotton wool, gauze, &c., as a dressing in place of the boric wool of to-day.

Oppenheimer, Son and Co., Ltd., in their circulars claim to have produced an improvement upon Sanatogen, and styled the substance "Robophos." It appears that the patent held by Wulfing in Germany has expired, and several pharmaceutical specialists and chemists are engaged in preparing a substitute or, as in the case of "Robophos," an improvement on the original commodity. We are told that "Robophos" consists of about 90 per cent. of casein and approximately 10 per cent. of glycerophosphates. A little cream added to the product improves the article as a diet, for a fatty element is introduced which is all essential in all foods, and although the whiteness of the Sanatogen with which we are familiar is supplanted by a faint cream colour, this is not to be regarded as an evidence of inferiority or careless substitution, but instead as an improvement of vital importance.

The popularity of Sanatogen is well known, but we consider "Robophos" a distinct improvement on the German product, and welcome the fact that a firm of the standing the manufacturers are known to be are dealing scientifically with this subject.

Notices of Books.

"Wellcome's Medical Diary for 1917" is entitled a "War Emergency Edition." For the practitioner in civil life, however, there is no decrease in the well-known usefulness of this compact and indispensable compendium which has characterized the Diary ever since its first appearance now many years ago. Recently introduced remedies are included, their physiological actions explained, their place and value in medicine systematized and classified, and their purity guaranteed.

Two remedies are especially recommended for general use: one, "Laxamel," which is, as its name implies, a pleasant laxative; the other, "Phenofax," a 3-per-cent. carbolic acid ointment described as an "Antiseptic Sedative Dressing," which serves as a ready remedy for many skin lesions and affections. The general information contained in this volume continues to be of great value to practitioners in whatever branch of medicine they may be engaged, and the instruction "to always write 'tabloid' in full" when prescribing, guarantees now, as it always has done, that "it is the safeguard of quality," we can cordially endorse.

Personal Notes.

India Office.

From July 4 to October 17, 1916.

Arrivals reported in London.—Colonial A. O. Evans, I.M.S., Major M. F. White, I.M.S., Major R. McCarrison, I.M.S., Major T. E. Watson, I.M.S., Major L. E. Gilbert, I.M.S., Lieutenant J. H. Smith, I.M.S.

Extensions of Leave.—Major G. King, I.M.S.; Major A. W. Overbeck Wright, I.M.S.; Lieutenant-Colonel E. C. Maco, I.M.S., three months, M.C.; Lieutenant-Colonel G. G. Gifford, I.M.S.; Captain R. E. Lloyd, I.M.S., to date of return to duty; Major G. A. Jolly, I.M.S., to November 19, 1916; Lieutenant-Colonel H. B. Melville, I.M.S., one week, M.C.

Permitted to Return.—Captain R. B. Lloyd, I.M.S., Lieutenant G. H. Mahony, I.M.S., Major G. A. Jolly, I.M.S., Major J. N. Walker, I.M.S., Major W. L. Trafford, I.M.S., Lieutenant-Colonel T. W. Irvine, I.M.S.

Colonial Medical Services.

St. Helena.

O. J. Murphy, M.B., B.Ch. (N.U.I.), to be Assistant to the Colonial Surgeon, St. Helena.

West African Medical Staff.

Deaths.—H. P. Lobb, M.R.C.S.Eng., L.R.C.P.Lond., D.P.H.Ire., Provincial Medical Officer, Nigeria, Northern Provinces; W. C. E. Bower, L.M. & S.Madras, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, Nigeria, Northern Provinces, killed in action while serving as Temporary Lieutenant, R.A.M.C.

Transfers and Promotions.—J. A. Pickels, M.B.Lond., M.R.C.S.Eng., L.R.C.P.London., D.P.H.Liverpool, Senior Sanitary Officer, Nigeria, Southern Provinces, to be Principal Medical Officer, Nigeria, Northern Provinces; H. A. Foy, L.M. & S.Bombay, L.R.C.S., L.R.C.P.Edin., L.F.P.S.Glas., D.P.H.Lond., Sanitary Officer, Nigeria, Northern Provinces, to be Senior Sanitary Officer, Nigeria, Southern Provinces; W. J. D. Inness, M.R.C.S.Eng., L.R.C.P.Lond., D.P.H.Ire., Sanitary Officer, Nigeria, from Southern Provinces to Northern Provinces; G. J. Pirie, M.B., Ch.B., D.P.H.Aberdeen, Medical Officer, Nigeria, Northern Provinces, to be Sanitary Officer, Nigeria, Southern Provinces; H. O'H. May, M.D., B.Ch. Dublin, D.P.H.Ire., Medical Officer of Health, Gold Coast, to be Sanitary Officer; A. C. N. McHattie, M.D., Ch.B.Edin., D.P.H.Cantab., Medical Officer, Nigeria, Northern Provinces, to be Medical Officer of Health, Zanzibar.

Retirement.—F. Manning, L.R.C.S., L.R.C.P.Ire., Principal Medical Officer, Nigeria, Northern Provinces, retired on pension.

Re-employment.—G. F. Darker, M.D., D.P.H.Durham, M.R.C.S.Eng., L.R.C.P.Lond., Medical Officer, Nigeria, Northern Provinces.

Temporary Appointment.—H. G. F. Spurrell, M.B., B.Ch. Oxon., F.Z.S., to be Temporary Medical Officer, Gold Coast.

The following officers, whose services have been placed at the disposal of the Army Council, have been given temporary commissions in the Royal Army Medical Corps: Messrs. G. G. Butler, R. Simple, Sierra Leone, H. O'H. May, Gold Coast, R. C. Macpherson, L. W. Davies, H. North, W. E. Glover, Nigeria.

Original Communication.

A NOTE ON THE OCCURRENCE OF TRICHONOCARDIASIS IN THE NATIVES OF THE GOLD COAST.

By A. Ingram, M.D., and J. W. S. Macfie, D.Sc.

In a previous paper (1916) the occurrence of trichonocardiasis in Europeans in the Gold Coast was briefly recorded, and a fourth variety of this affection, characterized by the light red colour of the nodules on the hairs, was described, for which the name Trichonocardiasis fusca was proposed. The prevalence of the disease in natives, however, was not dealt with because at that time a sufficient number had not been examined. During the last few weeks 493 natives have been inspected at Accra with a view to the determination of the incidence of the trichonocardiases amongst them, and a short note on the results may not be inappropriate.

Most of the cases of trichonocardiasis that have been recorded have been in Europeans, and but little appears to be known about the occurrence of the disease in natives. Castellani observed it in the Sinhalese, and Chalmers and O'Farrell (1913) state simply that they "have met with it in a negro," but do not give any particulars. In recording the occurrence of an "epidemic" of trichonocardiasis in the Welsh Regiment in Khartoum, Chalmers and Stirling (1913) traced the source of the infection to a washerman. If they were correct in this conclusion it is a matter of some importance to determine the prevalence of the disease in a country like West Africa, where all the washing is done by natives, for although the trichonocardiases are not serious nor dangerous infections, they may be troublesome, and are at best unpleasant. It should be mentioned, however, that Chalmers and Stirling do not appear to have made any control inspections, and although they found forty-two cases in the regiment and one in the nine washer-folk employed by the soldiers, this by itself hardly justifies the assumption that the disease was "epidemic," or that it was spread by a washerman. Our experience in the Gold Coast convinces us that the affection is very common both in natives and Europeans, and is generally overlooked.

PREVALENCE.

In order to obtain a rough idea of the prevalence of trichonocardiasis in the natives at Accra, the inmates of the asylum and jail and a detachment of the Gold Coast Volunteers were inspected. Altogether 493 individuals were examined, and of these 315, or 63·9 per cent., were found to be infected (see Table I).

TABLE I.—THE INCIDENCE OF TRICHONOCARDIASIS AMONGST THE NATIVES OF THE GOLD COAST COLONY.

Groups inspected	Number examined	Cases of trichonocardiasis	Percentage
Asylum patients	96	28	29·1
Inmates of the jail	253	176	69·6
Gold Coast Volunteers ..	144	111	77·0
Totals	493	315	63·9

At the asylum ninety-six natives were examined, namely, eight-two men and fourteen women, and twenty-eight, or 29·1 per cent., were found to be infected. Of the twenty-eight cases twenty-five were in men and only three in women, so that in this small sample the women appeared to be slightly less affected than the men. All the infections were axillary.

At the jail 253 natives were examined, all males, and 176, or 69·6 per cent., were found to be infected, many of them very heavily. A number of other prisoners were not counted as they had recently shaved or clipped off the axillary hairs, but it is probable that many of these had been infected, as the natives frequently remove the hairs when the nocardial nodules begin to cause irritation.

Of the Gold Coast Volunteers 111 out of 144 were found to be infected, that is, 77 per cent.

THE TYPE OF THE INFECTIONS.

Three varieties of trichonocardiasis were described by Castellani, namely, trichonocardiasis flava, or the yellow form, in which the fungus *Nocardia tenuis* is found alone; trichonocardiasis nigra, or the black form, in which *Micrococcus nigrescens* is associated with the fungus; and trichonocardiasis rubra, or the red form, in which *M. castellanii* occurs. To these one of us has recently added a fourth variety, trichonocardiasis fusca, in which the fungus is associated with a micrococcus that produces a yellow pigment.

In Ceylon the yellow and black varieties appear to be common, but the red occurs less frequently. In Khartoum, however, Chalmers and O'Farrell found the black form much rarer than the yellow or red. The great majority of the cases detected in the inspections of natives at Accra recorded in this paper were of the yellow variety, a few were of the light red or brown, but no cases of the black or the typical red varieties were seen. The typical red variety does occur in the Gold Coast, as has already been recorded by one of us, and some of the light red infections mentioned above were really slight infections of the same type. Up to the present no case of trichonocardiasis nigra has been observed.

Of the 315 cases of trichonocardiasis detected by us in natives 284 were of the yellow variety alone, that is, trichonocardiasis flava occurred in 57·6 per cent. of the natives examined. The cases varied greatly in colour, the nodules being sometimes almost white, sometimes decidedly yellow. The degree of infection also varied, but in many cases practically all the axillary hairs were involved and matted together.

The infections of a reddish or brown colour were much less severe. They varied in tint from a light red to a delicate brown, and probably included cases of both trichonocardiasis rubra and trichonocardiasis fusca. One case of a fine light red colour that was examined by means of cultures was found to contain *M. castellanii*. It was not possible to cultivate the organisms from all the cases and therefore no attempt will be made to differentiate them on macroscopical characters; but it should be stated clearly that none of them showed nodules of the deep red colour usually associated with trichonocardiasis rubra, although the distinction was one of degrees only and not of kind in some instances. Several of the cases included in this group were simultaneously affected with trichonocardiasis flava, but have not been enumerated with the other cases of the yellow type.

CONDITIONS FAVOURING THE OCCURRENCE OF TRICHONOCARDIASIS.

Castellani considered it probable that cases of trichonocardiasis would be found in every low-lying tropical country. Chalmers and O'Farrell, however, discovered the disease at Khartoum, where the climate is hot and dry, and concluded that it would "be found in many tropical regions, low-lying or elevated, if looked for." As the affection is limited, so far as is known, to the hairs in the axillæ, pubic regions, and groin, it may perhaps be assumed that anywhere in the Tropics the conditions in these parts of the body are as suitable for the growth of *Nocardia tenuis* as are the "hot, damp districts of Ceylon," where Castellani observed his original cases.

There is perhaps a connection between the occurrence of trichonocardiasis and hard manual labour or other forms of work conducive to free perspiration. In our series of examinations it is noteworthy that the lowest incidence was amongst the inmates of the asylum whose work was relatively light, and highest amongst the Gold Coast Volunteers who were undergoing training preparatory to embarking for East Africa at the time they were inspected. It is not improbable that the wearing of clothes may also favour the occurrence of trichonocardiasis by promoting perspiration and by forming "moist chambers" in such situations as the axilla, in which the causative organism can flourish. Of the three classes of patients examined by us the Gold Coast Volunteers were the most heavily clad, the asylum inmates the least, many of the latter preferring to go about practically without clothes, a state allowing a much freer evaporation from the surface of the skin.

CONCLUSIONS.

Trichonocardiasis is exceedingly common amongst the natives of the Gold Coast, and was found to occur in nearly 64 per cent. of the individuals examined by us.

The yellow form (trichonocardiasis flava) of the affection is the commonest, but both the red (trichonocardiasis rubra) and the brown (trichonocardiasis fusca) forms also occur. The black variety (trichonocardiasis nigra) has not been observed in the Gold Coast up to the present.

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THE JOURNAL OF
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JANUARY 15, 1917.

QUININE AS A PROPHYLACTIC: IS IT A FAILURE?

EVERY now and again we find medical men bold enough to come forward and state their doubts as to the efficacy of quinine as a prophylactic. This takes some courage to do, for such men are met with the query, "If you do not give quinine, what are you to do? Nothing?" The sanitarian will say, "Drain your district and prevent mosquito breeding, and you will have no malaria." The reply to that often is, "It is impossible to drain, say, Africa, so we must go on with quinine because we have nothing else to give or to do." The means in vogue at present whereby malaria may be checked or avoided are: Destroying the breeding-places of anophelines for, say, 150 yards around the dwelling-places; screening the abode to prevent the entrance of mosquitoes; screening the bed by the mosquito-net; and lastly, the taking of quinine as a prophylactic. Each has its advocates and supporters; some doubt the efficacy of quinine, but all believe in the drainage and "cleaning" up method—the screening of the house and of the bed.

At the meetings of the Society of Tropical Medicine and Hygiene, the question of quinine giving is apt to be left severely alone. But in the November, 1916, issue of the Journal of the Society, Dr. Angus MacDonald states boldly that "Quinine has its position in relief and cure, but in sanitary administration it has none," and in the next sentences we find him attacking quinine as a prophylactic. "Continuous drugging with quinine may prevent attacks of malaria in anopheline countries, but statistics are still lacking to demonstrate the extent to which the taking of this drug prevents infection. That the human individual is detrimentally affected by the continued absorption of quinine, be he infected with malaria or not, there can be little doubt. Whatever are the causes of blackwater fever, there seems to be a consensus of opinion that quinine has much to do with it—perhaps more to do with it than malaria has."

We admire Dr. MacDonald for his courage, and express our admiration of these concrete opinions he has formulated. Here we have something to discuss—no sly hint, but an opinion resonant with conviction based upon careful observation, and the results summed up with a precision we are not accustomed to when the subject of quinine prophylaxis is dealt with. One man at least has spoken out, and he but supports the belief of many, a few of whom have publicly stated their opinions, but he voices the hesitating thoughts of most of the medical profession who daily proceed to administer doses of quinine in a routine fashion and mostly under compulsion from a higher authority.

Orenstein, quoted by Professor W. T. Simpson, at the discussion which followed Dr. MacDonald's paper, states that at Dar-es-Salaam (Dr. Orenstein's) experience led him to give up the system introduced there by Professor Koch of giving quinine to the people in order to reduce the malaria, as he found it had not the success Professor Koch expected. At the same meeting Sir David Bruce, after relating an experience of the administration of quinine, said, "Ever since that time I have had a sceptical feeling in regard to the use of quinine as a prophylactic when in a malarious country. Many white people when in malarious countries take five or more grains every day as a matter of routine, and continue the practice for years. If this is definitely proved to be useless it would save a deal of discomfort."

In a subsequent number of the Journal of the Society of Tropical Medicine and Hygiene, December, 1916, we find Dr. C. F. Harford regretting Dr. MacDonald's statement, founding his regrets upon reports furnished by missionaries in many countries severely steeped in malaria, where a sanitary staff is unknown, and in which distant regions the establishment of a sanitary service is a remote contingency. Dr. Harford says, "For Europeans, particularly in Central Africa, East and West, with its abundance of malignant parasites, there is good cause for advocating the use of a daily dose of quinine of five grains which has in the past produced most important results."

Listening to these arguments, the writer, while wishing not a plague but a blessing "upon both your houses," begs to reiterate his oft-proclaimed belief that quinine by itself, either as a curative or preventive agent, is inefficacious, and as time passes this belief grows towards conviction. To put it shortly, the writer never now prescribes quinine by itself, whether as a prophylactic or as a remedial measure. In chronic malaria, as one meets it in Britain, the advantages of the combination of quinine with arsenic, opium, and calomel are convincing and undoubted. How many patients does one meet with who, after dosing themselves with quinine for months, after coming home, in the hopes of reducing a big spleen, find themselves no better and their state of health rather worse in fact for their "change home"? Give this patient quinine in combination and mark the change. On December 13, 1916, a man from West Africa presented himself with a spleen enlarged to what I classify as the fourth degree of enlargement—that is, the spleen was three fingers' breadth beneath the left rib cartilages. He had been having 5 to 10 to 15 grains of quinine daily for four months since he arrived in England and was no better. I put him on to quinine hydrochlor. gr. iii, acid arseniosi gr. $\frac{1}{24}$, pil. saponis co. gr. i, hydrarg. subchlor. gr. $\frac{1}{12}$, with directions to take the pill twice daily for a week, and afterwards once only. He returned upon January 11, 1917, with the spleen imperceptible to touch, he had no "low fever," he had gained in weight, and felt well. Not in every case will the spleen thus rapidly disappear. As a rule it takes a much longer time, but here within a month a spleen enlarged to the fourth degree had reached normal limits in practically four weeks It was a question of going abroad or not, of losing his position in a merchant's firm or taking it up again; condemned in December and passed in January is an end not often to be expected. But our experience in the matter is limited—limited, in fact, to well-nigh the writer's public statements, for although he has found several men agree with him in private as to the efficacy of quinine in combination, they do not make public statements of their belief. Many will say

"Yes, I often give arsenic with quinine," and we have "tabloids" thus prepared available, but the writer's contention is that without opium the efficacy of quinine and arsenic is lessened, and that mercury plays a definite part in the cure.

This is but the old English pill or powder, for the writer more frequently gives pulv. ipecac. co. gr. iii in place of the grain of pil. saponis co. mentioned above. The powder is given in a cachet or as a powder in water or milk, but the pill is more easily carried when going abroad; to ensure the pill not "passing through," the pill is to be snicked with a knife as deep as its centre before being taken.

For enlarged malarial spleens and chronic malaria, whether at home or abroad, the combination mentioned above has the support of time to justify its administration, and in the writer's experience consecrates the justification of to-day's trial.

As a prophylactic the combination has the elements of some faults and, it may be, objections. Many will say arsenic thus given will cause intestinal catarrh in time and must be left off. So far this objection has not been upheld; the writer has some score and more people under observation who in France (amongst old malarial subjects), in Salonika (men freshly exposed to malaria) and elsewhere, men who are taking the combined drugs, and who so far have not as yet had recurrences or attacks of malaria. J. C.

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Annotations.

Early Diagnosis of Smallpox (F. Willner, *Medizinische Klinik*, October 1, No. 40).—The first sign of the eruption is on the inner surface of the prepuce. This will probably reveal the variola before any other differentiating symptoms appear. In the eight cases described, nodules or pustules appeared here on the prepuce and ran their whole course ahead of pustules elsewhere. The men had either never been vaccinated or it had never "taken." They were not seen until the eruption was well under way, but the advanced state of the prepuce pustules showed that they must have preceded considerably all the other cutaneous manifestations.

Epidemic Jaundice (C. Moreschi and U. Carpi, *Policlinico*, October 22, xxiii, No. 43).—From the start of the Isonzo campaign cases of jaundice were occasionally observed. The number has kept increasing as also the gravity of the disease. The disease was always well under way when the men reached the base hospital. In some cases it came on insidiously, the jaundice being the first symptom to attract attention; in others there was at first a period of malaise with a chill and fever, oppression in the epigastrium and congestion of the conjunctiva. Herpes was almost constant and pronounced, while epistaxis was not rare. The temperature reached its highest point in the first two days and then gradually declined. In some cases the fever did not last beyond the first twenty-four hours. The intensity of the jaundice was not proportional to the severity of the disease; in some cases it was transient, while in others it persisted for weeks or months. The glands in the groin, axillas and epitrochlea were often enlarged but smooth. Of twelve guinea-pigs inoculated with about 1 c.c. of blood from the vein of three patients with this epidemic jaundice, two developed jaundice the tenth day, with bile pigments and albumin in the urine. A spirochæte was found in the tissues, probably the same as that described as responsible for infectious jaundice. Experiments with blood from patients were positive only with this one patient. The spirochætes have probably disappeared from the blood by the time the men reach the base hospital. Tests to determine the presence of paratyphoid bacilli were almost constantly negative.

World Distribution of Tuberculosis judged by Response to Skin Tuberculin Tests.—Schlesinger (*Zeitschrift für Tuberkulose*, xxvi, No. 3) expatiates on the absolute harmlessness of the Pirquet test and the ease with which its findings are estimated. As to its reliability, he says that the negative findings with infants may be due to the inability of the infant skin to react in this way, even although under other conditions there would be a positive response. The negative response is noteworthy further in tuberculous meningitis and miliary tuberculosis, during and after measles, and during the incubation and course of scarlet fever, as well as in far advanced cases. Feer has also observed cases of a negative response with active peritoneal tuberculosis, &c. Positive findings indicate beyond question that the organism has had a fight with the tubercle bacilli at some time. The fight may still be going on, as when the test is positive in children, but in adults this is not necessarily the case. The test on adults, however, is important for statistical purposes, and he reviews from this point of view a large number of reports of the findings with the test on hundreds of children and adults in various countries. Analysis of these figures shows that in remote regions where there is little intercourse with tuberculosis-tainted civilized states, the disease has very little, if any, foothold. The more the region becomes colonized with persons from the more civilized states, the more prevalent tuberculosis becomes. In villages and small towns apart from the highways of commerce tuberculosis spreads only very gradually, probably by the mediation of the school. In medium sized cities the children become infected before the school age, and in the larger cities a considerable portion of the children become infected with tuberculosis during the very first years of life. The exceptionally high mortality and the more rapid course of tuberculosis in peoples that lived remote and only recently had tuberculosis brought into their midst, suggest that in our environments a certain immunity has been acquired in the course of time, which is, of course, lacking in those peoples meeting tuberculosis for the first time. This immunity, he believes, is gradually growing more and more pronounced, and is the explanation for the gradual subsidence of the tuberculosis mortality which has been observed in the last few decades in Germany and England. In short, he exclaims in conclusion, the Pirquet skin tuberculin reaction has demonstrated better than all other means of investigation at our command, that in the distribution of tuberculosis the highways of trade and commerce, increased facilities for intercourse between the inhabitants of a country and of different countries, if not the only factor, is yet in a high degree the decisive factor.

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Abstracts.

PRELIMINARY NOTE ON A MONOMORPHIC TRYPANOSOME FOUND IN THE BLOOD OF A NATIVE OF THE GOLD COAST.[1]

By J. W. S. Macfie, D.Sc.

The patient was a native man, a member of the Gold Coast Constabulary, who was examined by Dr. E. W. Graham at Tamale and found to be suffering from trypanosomiasis. The history of the case suggested that the infection might have taken place about three weeks previously, but apart from slight fever, which may not have been due to the trypanosomes, the patient had no symptoms of illness. After the first injection of atoxyl the trypanosomes vanished from the blood, and up to the time of writing they have not reappeared.

The trypanosomes resembled very closely *T. vivax*, a parasite of which Bruce says, "This species of pathogenic trypanosome can at once be recognized among all the others by its shape alone." They were monomorphic—that is, they were all the same form and nearly of the same size. The body showed the characteristic abrupt narrowing immediately anterior to the nucleus. The cytoplasm was relatively clear, and showed an alveolar structure. The posterior end was usually blunt, and the large rounded blepharoplast was terminal or nearly so. The undulating membrane was poorly developed, so that the flagellum ran usually along the body in a more or less straight line, and there was always a long free portion to the flagellum. The nucleus was long, oval, and often divided into several pieces.

Of 200 parasites the longest measured 24 microns, the shortest 18 microns, and the average worked out at 20·7 microns. The numbers of trypanosomes of each length were almost exactly the same in the two films.

The morphology of this trypanosome very closely resembles that of *T. vivax*. The small number of measurements that have been made so far suggest, however, that it is a little smaller, the crest of the curve occurring at 21 microns instead of at 23 microns. The trypanosome appears, indeed, to be intermediate between *T. uniforme* and *T. vivax* as regards its morphology, but further examinations will have to be made before any definite conclusion can be arrived at.

T. vivax is an exceedingly common parasite of domestic animals in West Africa, and was found in no less than 76 per cent. of the hump-backed cattle examined by me at Accra. It would therefore be a serious matter if this species were proved to be pathogenic to man. Further investigations are in progress, and it is still possible that the strain may be obtained for laboratory experiments, although as the patient has been apparently free from parasites for a long time the chances are not very great.

CHENOPODIUM POISONING.[1]

By A. F. Coutant.

While carrying on the hookworm eradication work in Texas, among about 300 cases of hookworm disease treated with oil of chenopodium one case of poisoning occurred.

Oil of chenopodium, a volatile oil distilled from the Jerusalem oak or American wormseed, which is a common weed in many parts of the South, is being used with increasing frequency in the treatment of uncinariasis. It has been found preferable to thymol because it usually does not make the patients so sick and does not require that they fast for twenty-four hours or more; hence they are more willing to take treatments. It has been found very difficult to persuade patients to take a second or third course of treatment with thymol after they have been through the ordeal once, but the chenopodium ordinarily causes no discomfort whatever. Far fewer cases of toxic effects are on record from chenopodium than from thymol.

The dose of oil of chenopodium given for hookworm is 10 minims on each of three consecutive days. The capsules are taken one-half hour before a light breakfast, and the other meals are taken as usual. The last dose, on the third day, is followed in two hours by a dose of salts or castor oil to induce catharsis. With this dosage the percentage of complete cures, that is, cases showing negative stools on examination for ova, is from 40 to 45 in one course of treatment, 70 to 75 in two, 85 to 90 in three, &c.

Report of Case.

The patient was a young man who gave the history and symptoms of severe uncinariasis, and showed the ova in the fæces. Though 21 years of age, he weighed only 95 lb., was very anæmic, and was so weak that he had not been able to work for several months. He was extremely nervous, and was subject to nervous "spells," accompanied by intense headache. He had also had several attacks of recurring malaria during the few months just preceding.

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[1] Abstracted from the *Brit. Med. Journ.*, January 6, 1916.

[1] Abstracted from the *Journ. Amer. Med. Assoc.*, November 25, 1916.

The patient had taken two doses of chenopodium twenty-four hours apart, or 20 minims in all. On the afternoon of the second day of treatment, ten hours after taking the second dose, he was suddenly seized with severe, griping, cramplike pains in the abdomen, vomiting, intense headache, and nervous twitchings and tremors of the extremities. The temperature rose to 102° F., with sweating. The nervous condition progressed in a short time to a state of nervous prostration, and the patient became hysterical and was irrational for several hours. A local physician who was called in by the family found the patient on the verge of collapse—extremities cold and clammy, pulse shallow and rapid, heart weak. He administered strychnine, digitalis and nitroglycerine with the object of improving the circulation, applied warmth to the extremities, &c., and the patient rallied. Five grains of calomel were also administered. The stool resulting from this purgation was blood-tinged and contained much mucus and many hookworms.

The next morning the patient had another attack, not quite so severe, with intense abdominal cramps, vomiting, nervous symptoms, and temperature 100·6° F. The patient again became very weak, the heart rapid and feeble, and more stimulants were given. The patient improved slowly, and was so exhausted that he did not get out of bed for two weeks.

COMMENT.

This was evidently a severe case of poisoning with oil of chenopodium, and the symptoms, which coincide, in general, with those of other observers, indicate that the drug affects the central nervous system. It appears in this case also to have caused a local disturbance of the intestinal tract, which is indicated by the abdominal cramps, the bloody and mucous stool, &c. Whether the general condition of the patient, including his chronic malaria, or some undiscovered lesions of the intestines which allowed of unusual absorption of the drug are responsible for these extraordinary toxic manifestations, or whether this is a case of constitutional drug idiosyncrasy, it is impossible to say.

From the literature, Levy,[1] has collected reports of twelve cases of poisoning in this country. Nine of the patients died in from two to five days. Eight of the cases were in children under 13 years of age. The smallest dose given in these cases was 30 minims at one time to a patient of 10 years, who recovered, and 4 drops three times a day for two and one-third days (28 drops in all) to an infant of 1 year, which was fatal. These doses, it will be seen, are much greater than was given in the present case. Three of the fatal cases in Levy's collection were in members of the same family.

CONCLUSION.

Greater caution should be used in giving this drug to some patients who are chronically ill with uncinariasis or other disease.

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[1] Levy, R. L.: "Oil of Chenopodium in the Treatment of Hookworm Infections," *Journ. Amer. Med. Assoc.*, November 28, 1914, p. 1946.

STUDIES IN PROPHYLACTIC IMMUNIZATION WITH BACILLUS TYPHI-EXANTHEMATICI.[1]

By H. PLOTZ, P. K. OLITSKY, and G. BAEHR.

THE studies in prophylactic immunization against typhus fever, which form the subject of this communication, represent part of the work of an expedition sent to Serbia in June, 1915, by the Mount Sinai Hospital, New York, under the auspices of the American Red Cross. After the occupation of the country by the Bulgarians, the work was continued at the request of the Bulgarian military authorities. In January, 1916, at the invitation of the Austrian Government, this work was also begun in Volhynia, Russia, at that time the site of a rather widely spread epidemic.

The vaccine consisted of a suspension of fifteen strains of *Bacillus typhi-exanthematici* in physiologic sodium chloride solution which had been subjected to a temperature of from 58° C. to 60° C. (136·4° to 140° F.) for from half an hour to one hour. After being tested aerobically and anaerobically as to its sterility, the vaccine was then diluted so that each cubic centimetre contained about two billion bacteria, and 0·5 per cent. phenol (carbolic acid) or tricresol added. Three injections consisting of 0·5, 1, and 1 c.c., respectively, were given in five or six day intervals.

As the supply of vaccine was limited, it was considered advisable to restrict the vaccinations as far as possible to those persons who were most exposed to the danger of infection. The vaccine was therefore administered to the orderlies and members of the hospital staffs who came in contact with the patients on or before admission to the hospital when they were still infested with lice, and also to the men whose duty it was to remove the clothing and bathe and shave the patients on admission, or who were concerned in the sanitation of villages or towns in which typhus fever was epidemic. In addition, many entire hospital units were vaccinated, and in a few instances small military groups in which typhus fever had broken out and was in danger of spreading.

In Serbia, after the Bulgarian occupation, and in Bulgaria, the vaccine was used in sixty-three Bulgarian military hospitals and military sanitation units. In all, 5,251 men were vaccinated. Sixty per cent. of these were vaccinated in November and December, 1915, the rest during the first three months of 1916.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, November 25, 1916.

Cases of typhus fever first began to appear in large numbers in the Balkans toward the end of January, 1916, the maximum being reached by the end of February, though foci of the disease appeared in various parts of the country until the middle of May. According to our statistics, there were about 3,000 cases in the Bulgarian military hospitals. How many thousands occurred among the civilians in the villages throughout the country is unknown. Although the epidemic bore no comparison either in numbers or in severity with that which occurred in Serbia during the winter and spring of 1914-1915, it was nevertheless of fair size. The mortality averaged 11 per cent.

Among the 5,251 vaccinated men in the Bulgarian military hospitals and sanitation units, many of whom were frequently exposed to the danger of infection, there occurred three cases of typhus fever.

According to the statistics of the chief of the medical division of the Bulgarian army, the number of cases occurring among the non-vaccinated in these and other hospitals in Serbia and Bulgaria was many times greater, though the figures are not available for publication. For example, in the town of Uskub, in which there were five military hospitals, complete vaccination was carried out in four. In these four hospitals not one house infection occurred during the course of the epidemic. In the hospital in which vaccination was not carried out, thirty-four house infections occurred during the same period of time.

In the town of Gornijumier in Bulgaria, many cases occurred among the personnel of the hospitals before the vaccinations were instituted. During the course of the vaccinations (ten days) four more cases developed among them. After completion of the vaccinations no further house infections occurred, though the hospitals had over 300 admissions in the subsequent three weeks.

In the town of Radomir in Bulgaria, twenty of the personnel in the hospitals developed the disease before the institution of the vaccinations. After that time, although the number of hospital admissions increased, no further cases occurred.

In Russia the observations were chiefly carried out in the portion of Volhynia occupied at that time by the Austro-Hungarian forces, in the territory south of the towns of Dubno and Lutzk to the Galician frontier. This region was studded with Austro-Hungarian field and epidemic hospitals and quarantine stations for the isolations of typhus suspects. The epidemic lasted from December, 1915, to May, 1916, and chiefly affected the civilian population, though the army did not escape. Although the work was done by request of the Austrian War Office, for military reasons the statistics as to the extent of the epidemic were not available. Owing to the principle advocated by the general in command of the army group which occupied this territory, no figures as to the number of typhus cases which occurred during the winter and spring of 1915-1916, or as to the extent of the cholera epidemic which occurred in this region during the summer of 1915, have ever appeared in any public reports.

The typhus epidemic in Volhynia was, however, widely spread, and according to our observations the number of cases mounted into the tens of thousands. Owing chiefly to the constant shifting of troops and the movements of supply columns, practically no villages in this entire section remained free of the disease. Because of the absence of any railways throughout the entire territory and the almost impassable condition of the roads, the transportation of the typhus patients from the widely scattered villages to the hospitals was possible only by means of ox-carts drawn by one or more teams of horses. The small typhus hospital at which one of us lived for three months while carrying on bacteriologic and epidemiologic studies admitted over 200 patients with the disease during that time, although, because of the difficulties in the transportation of the sick, it was able to drain only a few villages in its immediate neighbourhood.

As in the Balkans, an effort was made to limit the vaccinations to those persons who were most exposed to infections, chiefly members of hospital staffs and sanitation units. The vaccine was used on 3,169 persons in forty-six institutions.

Up to the end of May, 1916, there occurred three cases of typhus fever among the vaccinated. Among the non-vaccinated during the epidemic there were many times that number, though for reasons previously stated no statistics are available.

In an adjacent army group the exposed members of the staffs of four epidemic hospitals were vaccinated, in all fifty persons. Previous to the introduction of the vaccinations, five physicians had died of typhus fever in the territory of this army group alone. Figures as to the number of infections occurring among the physicians, nurses and orderlies were otherwise not obtainable. The vaccinations were carried out in January, 1916. During the period of vaccination (ten days) five cases developed among the staff of the four hospitals in which vaccination was carried out. During the following four months of the epidemic no further cases developed, although, according to the chief of the commission for the control of epidemic diseases in this army group, no changes were made in the routine of handling the admissions to the hospitals, and the number of typhus patients admitted continued as large after the date of vaccinations as previously.

In all, 8,420 persons, members of 109 hospital, sanitation and other units in Serbia, Bulgaria and Volhynia, were vaccinated against typhus fever during the epidemic of 1915-1916, an attempt being made to include in this number only the persons who were most exposed to the danger of infection. Of this number, six developed the disease during the four months of the epidemic. Our experiences in the Balkans and Volhynia during the winter and spring of 1915-1916 with the vaccine made of *B. typhi-exanthematici* would seem, therefore, to indicate that it is capable of reducing the incidence of the disease, although it does not produce an absolute immunity to typhus fever.

DISAPPEARANCE OF MALIGNANT TERTIAN CRESCENTS FROM THE BLOOD FOLLOWING THE INTRAVENOUS INJECTION OF TARTAR EMETIC.[1]

By Sir Leonard Rogers.

The difficulty in completely eradicating a malarial infection is well known. Thus Norman Chevers relates that he suffered from attack for eighteen years in India after contracting the disease in Chittagong, and for six years more after he returned to England, and that his friend, Sir Ranald Martin, had frequent attacks of ague throughout his long Indian service, and for no less than thirty years more in England, although both of them took quinine freely for the attacks. Prolonged daily doses of quinine for months at a time will often prevent relapses, but even this measure may fail. A drug which will really cure malaria and destroy the infective extracorpuscular stage of the parasite is, therefore, still much to be desired.

Case I.—*Apyrexal Case showing numerous Crescents in the Blood treated with Tartar Emetic Intravenously.*

A Russian sailor, aged 20, admitted for general debility, but without fever. Numerous malignant tertian crescents found in the finger blood, one in every few fields of the microscope.

The following tabular statement will best bring out the treatment and its effects:—

	Blood examination	Treatment
First to third day	Very numerous crescents	—
Fourth day ...	,, ,, ,,	Tartar emetic 4 cg. intravenously
Fifth day	Very few crescents	Tartar emetic 8 cg. intravenously
Sixth day	,, ,, ,,	—
Seventh day ...	No crescents found	—
Eighth day ...	One crescent found	Tartar emetic 8 cg. intravenously
Ninth and tenth day	No crescents found	—
Eleventh day ...	,, ,, ,,	Tartar emetic 12 cg. intravenously
Twelfth to fourteenth day	,, ,, ,,	—

The patient left hospital two days later much improved in his general health, and having gained 10 lb. in weight. His temperature was normal while in hospital except for a rise to 100·2° F. on the evening after the injection of 12 cg. of tartar emetic.

Case II.—*Acute Malignant Tertian Infection yielding to Quinine: subsequent Appearance of numerous Crescents, which disappeared after Intravenous Injections of Tartar Emetic.*

European male, aged 45, admitted for fever of ten days' duration accompanied by rigors. Very numerous ring malignant tertian parasites were found, several in every field of the microscope.

A rise of temperature to 104·4° F. on the evening after the injection of 8 cg. of tartar emetic, followed by a very great reduction of the crescents in the peripheral blood, is very significant, in view of the fact that similar rises occur in kala-azar after the injections only as long as parasites are present, for such reactions are best explained as due to the liberation of toxins from the parasites destroyed by the drug. This view is supported by the fact that no ring intracorpuscular forms of the malignant tertian parasites were found during the time the crescents were present which could account for the febrile reaction.

Here we have a second case in which recently developed crescents rapidly disappeared from the peripheral blood following the intravenous injection of a single 8 cg. dose of tartar emetic. Two such consecutive cases are very unlikely to be an accidental phenomenon. The dose used in the last case is less than half what has been safely given repeatedly in kala-azar cases.

The Influence of Tartar Emetic on Benign Tertian Parasites.

The following experiences of the use of tartar emetic in benign tertian malaria are also of interest. Early in September last an Indian boy was admitted to my kala-azar ward. I found very numerous benign tertian malarial parasites in his blood. Although I recognized the presence of a rather serious infection I decided to try tartar emetic, and gave 4 cg. intravenously in a 2 per cent. solution, the strength used in all the cases mentioned in this paper. His temperature had varied during the previous three days from 99° F. in the morning to from 101° to 102° F. in the evening, but on the evening of the day on which the tartar emetic was given it rose to 104° F., showing a strong reaction. On the following day very few benign tertian parasites could be found. Two days after the first injection the same dose was repeated. On that morning only one parasite was found, and none on the next day or on several other occasions during the next three weeks. As low fever persisted when I saw the patient again, after an interval of three weeks, I did a spleen puncture and found Leishman-Donovan bodies, showing the case to be a mixed infection—a rare condition in Calcutta. As the boy objected to further intravenous injections he was given antimony ointment inunctions. He gained weight steadily, and has had no rise of temperature to above 100° F. during the last month. However, on making a recent examination of his blood I found one ring and one extracorpuscular benign tertian parasite, thus showing that the two comparatively small doses of tartar emetic had failed to eradicate his malaria completely, and suggesting caution in expecting too much from such a short course of the treatment. A 4 cg. dose was now given, and the parasite had disappeared again by the next day. He has had no quinine during the two months he has been in hospital.

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[1] Abstracted from the *Brit. Med. Journ.*, January 6, 1917.

Captain Hume has tried tartar emetic injections in two other cases of benign tertian malaria. In one man it required three doses of 4, 8, and 10 cg. to stop the paroxysms of fever and to cause the malarial parasites to disappear from the peripheral blood, so that in this case the drug appeared to be less efficient than quinine against the intracorpuscular stage of the benign tertian parasite. In the other case one 4 cg. dose was followed by the cessation of one paroxysm, converting the infection from a double to a single one. Quinine was then given and the fever ceased.

In the first of the above cases the effect of the tartar emetic on the malarial parasites was very striking, but in the second and third it appeared to be less efficient than quinine against the intracorpuscular stages of the parasite, while it is certainly far less convenient, owing to the administration of quinine by the mouth being much simpler than giving an intravenous injection.

COMMENTARY.

Much further experience will be required to settle these points, but the indications to be derived from these few cases appear to be that quinine should be used to check the malarial paroxysms, while tartar emetic should subsequently be given intravenously, in the hope that it may prove of value in destroying the extracorpuscular stages of the malarial parasites, and so prevent relapses, and greatly lessen the infectiveness of the patient to malarial-bearing mosquitoes, by killing the crescents of the malignant tertian variety and the corresponding resisting forms of the other types of malaria.

In view, however, of the many disappointments which have been met with in attempts completely to eradicate the protozoal parasites of malaria, sleeping sickness, and amœbic dysentery, it is well not to be too sanguine regarding the success, possibly only temporary, of tartar emetic given intravenously in causing the malignant tertian crescents to disappear from the peripheral blood in my two cases. The observations are, however, of sufficient interest and importance to make it advisable to place them on record without delay, in order to allow others to investigate the subject, as many prolonged observations will be necessary before any reliable conclusions can be arrived at. If this drug should prove successful in really curing malaria, or in removing the infectiveness of the patients treated with it, a new and most important addition will accrue to our armamentarium in the battle against the most widespread scourge of tropical and subtropical countries, the value of which it would be difficult to overestimate.

Since writing the above the following cases have been treated:—

CASE III.—*Malignant Tertian Crescents of an East African Infection treated with Tartar Emetic Intravenously.*

A European male, who had just returned from British East Africa, where he had suffered from several attacks of malaria, was sent by his doctor to consult me. I found crescents easily in his blood on two occasions with one day's interval. Eight cg. of tartar emetic were now injected intravenously, and two days later no crescents could be found by a careful search of two blood films. Two further doses of 10 cg. each were given on alternate days, and on each occasion the blood was examined for parasites with a negative result, and he stated that he felt much better after the treatment.

No reactionary rise of temperature occurred in this case, the crescents having been fewer than in Case II. As blackwater fever frequently follows repeated attacks of African malaria, if the destruction of the crescents in the peripheral blood should prove a preventive of relapses, blackwater fever itself may possibly be greatly diminished by the tartar emetic treatment.

CASE IV.—*Benign Tertian Gametes disappearing from the Blood after the Intravenous Injection of Tartar Emetic.*

A European male from Assam, admitted for malarial fever for which he had taken quinine; he had had no fever after admission. Only the quinine-resisting extracorpuscular fully developed parasites were present in the peripheral blood, and were easily found on three consecutive days. On the fourth morning 8 cg. of tartar emetic were given intravenously. A blood slide taken that evening showed after a long search one benign tertian gamete with distinct chromatin body and pigment, but with an incomplete outline as if it was breaking up. A careful search on the following four days showed no malarial parasites. During this time he received two further doses of 10 and 12 cg. respectively of tartar emetic intravenously, after the last of which he felt some nausea. He has now left hospital, but I hope to be able to follow him up.

This case indicates that the drug has a destructive effect on the gametes of the benign tertian as well as the malignant tertian variety of malaria, and makes it probable that it will act similarly on the quartan form, which is rare in Calcutta.

SAND-FLY FEVER AND DENGUE.[1]

By W. L. Harnett.

Early in 1913 the writer published [1] a paper detailing some observations he had made on the changes which take place in the differential leucocyte count during an attack of dengue and in the early days of convalescence. Balfour [2] had already described late eosinophilia in cases of dengue occurring in Khartoum.

All writers on dengue recognize the existence of a short type of fever in this disease, the temperature chart of which is indistinguishable from that of sand-fly fever, whilst we also find accounts of "seven-day" type of sand-fly fever and references to "secondary fever" and "relapses" in accounts of outbreaks of that disease. It would appear then that, however much typical attacks of these two diseases may differ, numbers of cases occur which are intermediate in type and impossible to place in either category; they are regarded as mild types of dengue, or as severe types of sand-fly fever, according to which disease the particular author is discussing. Sand-fly fever and dengue may also be regarded as two varieties of the same disease, linked together by the "aberrant" cases of each type, but essentially one and the same. The identity of the blood picture in the two conditions seems to furnish very strong evidence in support of this view.

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[1] Abstracted from the *Indian Medical Gazette*, December, 1916.

Relapses and Second Attacks.—It is commonly stated that second attacks occur in only 5 to 10 per cent. of cases, but that relapses may occur from excessive exercise during convalescence. It is not easy to see how a distinction is to be made between a relapse and a second attack; a few cases in which the second attack followed within two weeks of the first might be called relapses, but in the majority of the second attacks the interval was three to six weeks, which would seem to justify them being regarded as a fresh infection. In 143 admissions, occurring amongst 102 patients, the proportions were as follows:—

1 attack in 66 cases = 66 admissions.
2 attacks ,, 31 ,, = 62 ,,
3 ,, ,, 5 ,, = 15 ,,

Blood Examinations.—Differential leucocyte counts were made on the second or third day of the fever and again on the eighth or ninth day in a series of fifty cases, which were not selected in any way. In four of the cases a third count was made about the end of the second week from the commencement of the attack, and in four cases the changes were followed in detail by examinations at short intervals up to third or fourth week. In these latter cases the total leucocytes per c.mm. were also estimated, in order to arrive at the absolute numbers of leucocytes per c.mm. In the rest of the series time did not permit of this being done. Five hundred leucocytes were counted in all cases and the counts were done across the film and not along the edges, in order to avoid error from unequal distribution of the different varieties of leucocytes. In nearly all cases a microscopical examination of the fæces was made after the administration of a purgative. This was the more necessary as such a large proportion of the patients were Gurkhas, a race who are notorious for harbouring intestinal parasites. Ova of trichiurus were found twice, of ascaris twice, and of *Ankylostoma duodenalis* once in the series, whilst the remaining cases were negative. The counts from these worm-infected cases did not differ in any way from the others. Leucopenia was invariable, as has been recorded by all writers.

The average proportions of the different leucocytes were found to be as follows:—

	1st count Per cent.	2nd count Per cent.
Polymorphonuclear neutrophiles ...	67·6	40·8
Lymphocytes	22·6	43·1
Eosinophiles	1·27	10·9

The above figures are averages calculated from the whole series of fifty cases. Where more than one subsequent count was made, that one was selected for calculating the averages in which the changes regarded as characteristic were most marked. Both large and small lymphocytes are included under the term "lymphocyte," as they both take part in the increase shown in the second count. Large mononuclears and transitionals do not undergo any characteristic change in numbers, so no averages have been worked out for them. The changes recorded in the above figures, a fall in relative numbers of the polymorphonuclears, and a rise in the relative numbers of the lymphocytes until they actually exceed the former class in numbers, with an increase of the eosinophiles, is graphically represented in the annexed chart. With a view to determining the rate at which these changes progress and their extent, a series of counts was made in Cases 46 to 50 on the second, fourth, sixth, eighth, tenth, fourteenth, eighteenth, twenty-second, and thirty-second days. To determine whether the changes in the relative proportions of the leucocytes synchronized with a change in actual numbers, the total leucocytes were counted on each occasion in Cases 47, 48, and 49, and the numbers of each class of leucocyte worked out and plotted on the charts reproduced. It was seen by comparing the curves of the relative and absolute numbers of the leucocytes in Cases 47, 48, and 49 that there is a decrease in the actual number of the polymorphonuclears, reaching a minimum about the fourth to sixth day, followed by recovery, and an actual increase in numbers of the lymphocytes simultaneous with an actual though smaller increase in numbers of the eosinophiles. Although this increase in numbers of the eosinophiles usually reached its maximum about the sixth day, it might in some cases be delayed, a fact which may explain the low eosinophile percentage in some of the counts. In Case 28 the eosinophiles, which were 0 per cent. on the eighth day, reached 4·6 per cent. by the sixteenth day, whilst in Nos. 45 and 46 percentages of 4 and 0·8 became 9·4 and 2·4 a week later. It was noted that in some cases in the series the increase of eosinophiles, though present, was very slight, hardly exceeding normal limits and that these were mostly in the Europeans and Punjabs, whereas it was rare for a Gurkha not to show well-marked eosinophilia. It is probable that the generally accepted normal standards for the relative proportions of the different leucocytes require modification in the case of certain races in India. For this reason, though I am convinced that some degree of eosinophilia occurs in the majority of cases of sand-fly fever during convalescence, I am not now disposed to attach so much importance to the diagnostic value of this point as I formerly was.

Cases admitted with second infections or relapses do not show any notable differences in the counts from the fresh infections and their counts passed through the same changes as in the primary cases.

Sand-fly Fever and Dengue.—It is customary to regard sand-fly fever as a short fever and dengue as a longer one, but it is evident that a classification of a series of charts of each disease will reveal cases of sand-fly fever in which a secondary fever, sometimes abortive and sometimes well-marked, occurs, whilst numbers of cases of short attacks, in which the secondary fever is wholly or partially suppressed, will be found in a series of dengue charts. The cases with slight secondary rises of temperature are often missed, owing to careless charting by orderlies or to discharge of patients from hospital as soon as fit for light duty. The records of outbreaks of the two diseases in India throw some light on this point.

It is obvious that dengue, as met with by the writers, was a fever lasting six days or so in half the cases, whilst in the remainder it only lasted two to four days. On the other hand, all the records of sand-fly fever agree in describing a certain small percentage of cases in which the fever lasted longer than the classical three days. I consider that my figures of 18 per cent. of cases lasting more than three days, and 10 per cent. lasting more than four days are likely to be nearer the truth than those of former writers.

Turning now to the clinical signs and symptoms, *I am unable to fix on any points whereby the two may be distinguished.* The mode of onset, the character of the pains, the amount of prostration, and the involvement or otherwise of the gastro-intestinal system are points which in both diseases may vary from the mildest to the most severe; they are useless for distinction. So also with the appearance of the tongue, the slow pulse, and the protracted convalescence. There remains only the terminal rash. The difficulty of detecting slight and evanescent rashes in dark-skinned races is obvious, and also of differentiating them in fair-skinned races from prickly heat and sudaminal eruptions, which are almost universal in the subjects of a fever which occurs during the hot season. Most records of dengue are very vague as to the proportion of cases showing terminal rashes; in some outbreaks it is as high as 70 per cent., in others as low as 8 per cent. I have never seen terminal rashes in sand-fly fever cases and I have found them rare in dengue cases, as met with in Bengal and Assam. My impression is that the terminal rash can be detected in a fair proportion of Europeans suffering from the severe types of dengue, never in the mild types, and very rarely in Indians. In sand-fly fever no writer has recorded rashes in either European or Indian cases. These would be particularly valuable in clearing up this point, which at present must stand as a distinction between the two.

The averages of the first and later counts in a series of cases of dengue were as follows:—

	1st count Per cent.	2nd count Per cent.
Polymorphonuclear neutrophiles ...	67·2	56·1
Lymphocytes	23·9	28·5
Eosinophiles	1·7	13·4

The averages of the first counts are almost identical with the averages of the first counts in the series of fifty cases of sand-fly fever, both having been made on the second or third day. In the case of the second counts the correspondence is not so close, as the dengue counts were taken at irregular periods, some on the eighth day, some on the eleventh and thirteenth days, and in one case as late as the nineteenth day. Still the same changes are shown as in the sand-fly fever series, diminution in polymorphonuclear neutrophiles and increase in lymphocytes and eosinophiles, but on account of the later date the divergence from normal shown by the averages are not so great, many of the cases having had time to pass the point of maximum intensity and to revert towards the normal. The average increase of the eosinophiles comes out rather higher than in the sand-fly fever series. It is evident then that the blood changes in the two conditions are identical.

As to the ætiology of the two conditions there has been no fresh discovery during the past three years. Both diseases are due to filterable viruses and both have been conveyed by inoculation with the blood of sufferers, but whereas blood of sand-fly fever cases does not convey the infection after twenty-four hours, that from dengue cases will do so up to the second to fifth day of the disease. This is not surprising when we consider the different duration of the fever in typical instances of the two conditions. Phlebotomy can convey the infection of sand-fly fever seven to twelve days after feeding on a patient in the first twenty-four hours of the illness. Dengue has been conveyed by infected culices eight times and by infected stegomyia once; in this case the mosquito was infective immediately after a meal of dengue blood and remained so eight to twenty-seven days after. I know of no experiments on the possibility of the conveyance of sand-fly fever by mosquitoes or of dengue by phlebotomy. These diseases may be capable of being conveyed by more than one insect vector and may undergo modification under these circumstances.

Much of the available evidence seems to point strongly to the *conclusion that we are here dealing not with two closely related fevers, but with one and the same fever, modified by circumstances as yet unknown.* I would suggest that sand-fly fever is the ordinary endemic type, but a certain percentage of cases of severer type are met with, many of which are indistinguishable from dengue, 80 to 85 per cent. of cases, however, being of the mild type. When occurring in epidemics the disease tends to assume the severer form in at least half the cases, the fever lasting five or six days and being often accompanied by a terminal rash; this is the type we know as dengue.

REFERENCES.

[1] Harnett. *Indian Medical Gazette*, vol. xlviii, No. 2, February, 1913.

[2] Balfour (1908). "Sup. 3rd Rep., Wellcome Research Lab." p. 38.

Drugs and Appliances.

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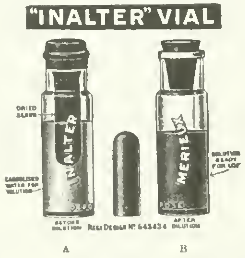

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Contents.—*Introductory — Clinical History — Pathological Histology—Ætiology—Pathology—The Hyperkeratoses—Diagnosis—Treatment—Summary —Acknowledgments—References—Illustrations.*

Introductory.—The subject of the hyperkeratoses has been but little studied in the Tropics notwithstanding the distress which they cause to their unfortunate victims, and therefore we bring forward our account of the present case as the first of a short series of notes which we hope to publish on the subject of these complaints as seen in the Anglo-Egyptian Sudan.

More than one year ago a man afflicted, as to his feet and hands, in the manner depicted in Plate I, figs. 1 to 4, and in Plate II, fig. 5, applied for treatment at the Civil Hospital in Omdurman.

It was obvious that he was suffering from some form of *Hyperkeratosis* in definite areas of his feet and that his hands were affected in the same manner but to a less degree, while there was well defined *Hyperkeratosis Subungualis* affecting the nail beds in both hands and feet (figs. 3 and 4).

Although the superficial pathological processes were sufficiently obvious, still the general character of the disease appeared to us to be most unusual, as we had never seen or read of any similar case at that time.

By good fortune, Dr. Christy happened to be passing through Khartoum when we were examining this man, and he at once recognized the complaint as a disease in natives in regions bordering upon the Upper Congo and especially in the Welle and Ituri districts where, he informed us, it is known by the name of "*Karondo*," a term not confined to any single district or language. He also kindly told us that the same complaint occurred in Uganda, where it was less commonly seen than in the Congo. He further informed us that the natives attempted to obtain a cure by cutting away the thickened epidermis with a knife but without success.

The only reference which we have been able to trace in the literature at our disposal in Khartoum is the account of a case exhibited at the Clinical Society of London on April 23, 1899, by Colcott Fox. The case was that of a boy, aged 10 years, suffering from *Hyperkeratosis Subungualis* of the hands and feet associated with large horny growths over the balls of the big and little toes, on each side of the first phalanges of the toes, and on each side of the heels. The hands showed fissured horny growths on the pulp and flexor aspects of the root of the first phalanx of each thumb, as well as a thickening of the epithelium on the backs of the knuckles and small discoloured areas at the root of the index and middle fingers on their flexor aspects. Small horny growths were noted in the upper portion of each popliteal space and on the inner aspect of each gluteal region.

Colcott Fox remarked at the time that, although there were numerous records of peculiar hyperkeratoses of the extremities and nails, he only knew of one case resembling his patient. The case he referred to was that of a Mexican seen by Dr. Ohmann-Dumesnil, who gave him a photograph.

There is an illustration in the appendix to the Sydenham Society's translation of Küchenmeister's "Animal and Vegetal Parasites," which somewhat resembles the condition depicted in Plate I, fig. 2, of the present paper, but the similarity is only superficial, and it seems to us that it is very doubtful whether it is the same condition, especially in the absence of a full description of the case.

With regard to the *Hyperkeratosis Subungualis* as seen above and without associated hyperkeratoses, it appears to be fairly common and there is a considerable amount of literature on the subject, the more important of which has been gathered together by Wilson in 1905, while Unna, in 1896, described its pathological histology in his well-known work.

The above references, with a brief note on two allied cases by Abraham which will be mentioned later, complete the information which we have been able to obtain with regard to this peculiar condition, and therefore we pass on to consider the clinical appearances of our Sudanese man.

Clinical History.—The patient is a Shilluk, born about thirty years ago at El-Muselemaieh, on the Blue Nile, some fifty miles south of Khartoum.

As hyperkeratosis is sometimes found to be inherited an attempt was made to analyse his family and personal history. He, however, knew nothing whatever about his father, but said that his mother when pregnant with him was bought as a slave and brought from Fashoda to the place where he was born, and he appeared to be certain that she never suffered from the same complaint as that with which he is afflicted. She is believed to have died of smallpox.

He lived in his native village till he reached the age of 9 years, and says that the condition of his hands and feet began when he was very young, and that he cannot remember a time at which he was able to walk about like other children.

He says that at times the thickened areas on the soles break down and produce the condition present when we first saw him, while at other times they are in the state which he presented nine months later, i.e., simply thickened areas with deep fissures.

Three years ago he contracted syphilis, for which he was duly treated. He is not married and has no children.

Except for these two diseases he appears to have enjoyed good health, and on examination his organs and urine were found to be normal, as was his temperature. A blood count was not performed because the syphilitic infection would have masked any other influence, although he showed no signs of this disease at the time of examination.

With regard to the soles of the feet, their appearances are depicted in figs. 1 and 2. The right foot shows marked hyperkeratosis over the heel and along the inner side of the foot in two areas, in which the horny layer is broken up by deep cracks or fissures dividing it into isolated areas, some of which have disappeared, leaving deep depressions covered with softer epidermis which is tender and readily bleeds.

In front of this area the epidermis appears to be abnormally thin and glazed, but further forward there is a thickened area just behind the second, third, and fourth toes which presents the same appearances as already described for the areas of the posterior region of the sole.

With regard to the left foot there is much the same general arrangement, but the loss of the islands is more marked in the middle area, which therefore shows a large hollow. The area over the heel is small and only cracked while the anterior thickening is limited to the interval between the first and second toes.

There are hyperkeratosic and cracked areas on the inner side of each big toe and slightly on the outer side of the little toe.

As to the nails of the hand (fig. 4), they exhibit in a typical condition Hebra's *Hyperkeratosis Subungualis* with its wedge-shaped mass of horny cells extending backwards as far as the lunula, and with its elevated nail constituting an inclined plane; but in the foot the conditions are quite different, the nail being more or less detached (fig. 3) and twisted to one side, while the thickened layers of the bed are cracked and broken. This difference is probably due to walking, and more particularly to the action of the shoe.

The hands (fig. 5) show thickenings of the horny layer in places on the palms, and on the ventral aspects of the fingers, but these thickenings are not so marked as in the areas on the soles of the feet, and though cracked do not form sores as in the feet.

There is a slight hyperkeratosis over the elbows and knees, but, apart from these peculiarities, the skin is normal.

He underwent some treatment, as will be detailed below, and subsequent to this we saw him again some nine months after his first visit.

The areas of the foot now exhibited only hyperkeratosis with deep cracks which marked out islands of epidermis none of which had broken off and therefore no depressions were visible.

According to the man the broken-off areas of epidermis producing sores were not always present, but alternated with the present state of mere cracks in the thickened epithelium, which he considered to be his normal condition and which had lasted as long as he could remember.

There was a complete absence of erythema in the hands, nails and feet, but there was some hyperidrosis of the palms of the hands and the soles of the feet.

This completes the clinical history, and we now pass on to the pathological histology.

Pathological Histology.—We have studied the histology of pieces of tissue removed from affected areas on the palms of the hands, on the nail beds of the fingers, and on the soles of the feet.

The Hands.—The earliest stage of the disease as shown by our sections is that set forth in preparations made from affected areas on the palms of the hands.

Examined under a low power these sections show that the stratum corneum is enormously thickened (fig. 11) and far from normal in structure, showing curious rounded or oval areas (fig. 12), while it is divided by a series of darkly staining wavy lines into horizontally running areas (fig. 12) composed of cupola-shaped masses of cells bounded on each side by inverted cupolas or wedges of cells which more or less mark the interpapillary areas while the cupolas indicate the papillæ. No stratum lucidum is visible, but the stratum granulosum is abnormally well marked and composed of several rows of cells (fig. 11). The rete Malpighii is also considerably thickened and has extended as a network of anastomosing columns of cells into the corium, which otherwise does not appear abnormal.

In studying these sections under a high power it is advisable to work in just the reverse direction to that used in describing the low power appearances and to begin with the corium. The sweat glands appear to be normal, but they are surrounded with more cellular elements and slightly more connective tissue than we think to be usual. The deep vessels of the corium are distinctly dilated but do not seem to be otherwise affected, while the general connective tissue of this layer of the skin appears normal with the exception of the fact that there are more connective tissue corpuscles than usual and that some endothelial and plasma cells can be seen.

The papillæ are very different from the normal (Plate III, fig. 11) in that they are cut up into a series of spaces by the anastomosing network of cells alluded to above, and therefore probably in no way represent in position the papillæ of normal skin from the same region. They contain rather more capillary vessels and decidedly more connective tissue cells than normal, while endothelial and plasma cells can also be seen.

With regard to the epidermis, the stratum germinativum appears to be normal but the rete Malpighii is not merely increased in thickness, having penetrated into the corium in the form of interlacing strands of cells (Plate III, fig. 11), but its prickle cells appear to be suffering from pressure, as they do not show the usual prickles and interspinous processes, but their striæ are well marked. The substance of the nuclei of many of these cells appears to have shrunk and to have left a vacuole apparently bounded by the remains of the nuclear membrane. This nuclear change does not appear to be artificial because cells in contact with these degenerate cells do not exhibit any abnormal nuclear change.

The pathological process at work in this layer appears to be that named "*Acanthosis*" by Unna, by which is meant an increase in the number of prickle cells in which the fibrillary structure is retained, but associated with this there is direct evidence of the effect of pressure upon these cells in the loss of the prickles and perhaps the vacuolation of the nuclei, and this pressure may be due to the hypertrophied horny layer.

With regard to the stratum granulosum, it appears to consist of prickle cells in which keratohyaline granules have appeared and to merge insensibly into the rete Malpighii on the one hand, and into the stratum corneum on the other, as we have been unable to find any traces of the stratum lucidum.

The stratum corneum is in a curious condition, and appears in general to be composed of more or less cornified and modified prickle cells, which in its deepest parts resemble closely the prickle cells described above, but differ in that they have lost the striæ and in the possession of a certain amount of cornification. This horny formation is obviously abnormal, as many of the cells contain minute rounded or oval hyaline bodies, some possessing a doubly contoured margin. These bodies, which are minute examples of Darier's bodies, appear to represent partial hyaline degeneration of the cytoplasm of the cells.

In the different parts of this horny layer the cells vary in character but they never seem to be true horny cells, but merely more and more cornified prickle cells modified by pressure. In other words, the horny layer is not merely hypertrophied and composed of cells which cling together when treated with pepsin and hydrochloric acid and therefore to be in a condition of hyperkeratosis, but also because of the peculiar cornification of the body of the cells to be in a condition of partial dyskeratosis.

We have already noted the cupola-like and the inverted cupola-like collections of cells corresponding more or less with the papillary and the interpapillary areas of the corium, and now we observe that in places these interpapillary areas appear to be formed into roundish or oval areas of cells (fig. 12), some of which appear to be nucleated, while others contain granules staining exactly the same as those of the stratum granulosum, while still other cells appear to be more or less normal horny cells with air spaces between them, which, however, may be artefacts.

The most superficial layers shown in our specimens still retain the appearance of cornified and pressed prickle cells rather than true horny cells.

The Nail Beds.—We have studied the histology of the hyperkeratosis subungualis shown in our case by means of transverse sections taken at the side of, and in the middle of, the thickened area, but unfortunately these latter were not deep enough to reveal the structure of the corium, so that we have to trust entirely to our lateral sections for a description of this layer which is a defect.

The corium is composed of dense connective tissue with a reasonable number of connective tissue cells and without any evidence of wandering leucocytes, endothelial cells, or plasma cells. The vessels are, however, in a curious condition, especially in the deeper parts of the sections, where some show signs of endarteritis leading to occlusion of very small vessels, while one large vessel showed very evident periarteritis. More superficially these signs of vascular irritation have disappeared and the vessels are somewhat dilated, which are important points in the pathology of the condition.

Ridges of the corium run deeply into the rete Malpighii and contain many dilated vessels which apparently can penetrate surrounded by mere traces of connective tissue deeply into the rete (figs. 9 and 14), and even passing through this layer into the deepest layers of the horny cells (fig. 9), thus producing one variety of the peculiar cellular islands seen in both these layers (figs. 9 and 14).

The stratum germinativum appears to be fairly normal, but the rete Malpighii is distinctly hypertrophied as a whole and not as processes extending into the corium. As its cells show very distinct striæ it is obvious that there is a definite but small amount of acanthosis. In its deeper parts the cells are compressed, the prickles and interspinous spaces are absent, but in the more superficial parts, and especially in the neighbourhood of the ridges, the cells show very distinct prickles, which, however, are closely appressed.

As the prickle cells pass peripherally they become more and more vacuolated, and just below the horny layer they contain a few keratohyaline granules and may be considered to form a kind of stratum granulosum, although the cells are merely compressed and vacuolated prickle cells with partially cornified walls.

The outstanding feature of the rete Malpighii is the possession of peculiar islands (fig. 9, the small rounded body shown in the upper right-hand corner, and fig. 14) which are composed of spaces containing red blood corpuscles and bounded by a distinct wall which here and there shows a nucleus, and which therefore may be composed of endothelial cells.

Outside these definitely circumscribed capillary vessels there are less well defined spaces containing corpuscles, while the whole is surrounded (fig. 14) by granular striæ, which look as though they were derived from the prickle cells rather than being the fibrillæ of connective tissue.

In other places, however, there appears to be a definite but minute trace of connective tissue adjoining the vessels.

Further out still the cells are often arranged so that their bases form a ring of thickened fibrillar material (fig. 14). This layer of cells resembles the ordinary prickle cells, but in some places gives the appearance of a stratum germinativum. Further out are the prickle cells just described above.

We have noted another curious form of island in the rete Malpighii, and this was composed of tightly compressed fibrillated walls of cells, and gives an appearance as though some vacuolated cells, resembling those in the immediate vicinity, had been pressed together until all the vacuoles had disappeared. No trace of a stratum lucidum could be detected.

The stratum corneum as a whole is fairly dense but shows in many places traces of nuclei and also exhibits some remarkable islands of cells. The most peculiar, perhaps, are those which possess blood-vessels containing blood corpuscles and surrounded by what looks like fibrillæ derived from prickle cells, the nuclei of which lie more peripherally, forming with denser striæ a sort of ring around the vessels. Peripherally to this ring lie densely striated or vacuolated cells which correspond to those of the rete. More peripherally still, and in contact with the horny cells, lie vacuolated prickle cells with thick striated walls and containing keratohyaline droplets with also (and from our present standpoint more importantly) hyaline droplets.

Other islands (fig. 9) lack blood-vessels, being only composed of modified prickle cells containing vacuoles and, when situate peripherally, keratohyaline and hyaline droplets. In other islands the hyaline droplets are more to the fore and the keratohyaline less marked, while the hyaline (fig. 8) tend to fill the vacuolated cavity of the cell.

Other islands are composed simply of nests of cells containing hyaline material (fig. 13), but the derivation of these especially peculiar islands can be traced from those previously described by examining fig. 8, in which the island lying nearest to the pointed upper end of the photograph is composed of prickle cells, while the next lower island shows distinct degeneration of the cell contents, and the lowest island, although it has lost half its contents in making the section, demonstrates the hyaline degeneration. When traced peripherally these islands of hyaline-laden cells gradually lose their hyaline product and become horny cells (fig. 13).

More peripherally still comes the nail which in the fingers is unaffected by the pathological process producing the hyperkeratosis.

The curious points observed in these sections open up matters for discussion, which will be dealt with when considering the pathology of the whole condition.

The Foot.—In the sole of the foot we have examined, histologically the affected areas depicted in figs. 1 and 2, but so complicated are the histological changes presented by these sections that we have been compelled to attempt to reproduce by a series of superimposed photographs the appearances shown by the microscope.

These superimposed photographs are depicted in figs. 15 and 16, and if these are examined it will be noticed that the top portion of fig. 15, labelled d, fits exactly on to lowest part of fig. 16, labelled e, and, that in both these instances only a portion of the photograph is depicted, so that there can be no mistake as to which portion of one figure joins on to the next portion of the other figure.

It will be observed that these series of photographs are intended to trace out a single papilla and the neighbouring interpapillary areas, but the papilla will be observed to bend considerably, and in order to keep the photographs in line we have been compelled to leave out a small wedge at the lower right-hand corner of photograph c, as this would have tilted c and d to the left, and would have rendered the size of the plate ill-suited to the Journal. It is easy to see where the wedge is missing, and as it does not interfere with our description it is thought by us to be not only unimportant but actually advantageous from the point of view of illustration.

Other figures, viz., figs. 6, 7 and 10, also depict those portions of the sections which are thought to require more detailed illustration.

In order to describe the histological appearances presented by the sections and by the photographs it is necessary to divide the description into the following sections:—

(1) The corium.
(2) The interpapillary epithelial areas.
(3) The papillæ.
(4) The superficial epithelium.

The Corium.—Figs. 7 and 15 show those portions of the corium which are often called the subpapillary layer. It will be noticed that there are downgrowths from the epidermis into the corium of much the same nature as in the hand, with the exception of the fact that they do not interlace to form the network shown in fig. 11, but remain as isolated downgrowths.

When figs. 15 and 16 are examined it will be observed that these downgrowths have greatly elongated, bent, and subdivided the papilla depicted therein. It will also be noted that the central cells of the older of these downgrowths have become modified into granular and horny cells, thus forming the bizarre islands of cells demonstrated in fig. 15, which are really interpapillary and intrapapillary in position, e.g., note the way the large cell island shown in fig. 15 b and c divides the papilla into two branches which unite above and below it.

The vessels of the corium are dilated and the fibrous connective tissue possesses numerous corpuscles, and there are also large numbers of plasma cells scattered throughout the corium.

The Interpapillary Epithelial Areas.—If figs. 7 and 15 are examined it will be noted that the interpapillary downgrowths which are nearest the corium, and therefore the youngest, are composed of a stratum germinativum and prickle cells only, and that they show either divisions of the downgrowth partially enclosing areas of corium or in their deeper parts islands of enclosed corium.

When, however, older areas are examined in the same figures it will be seen that in addition to these features the prickle cells nearer the centre of the mass become vacuolated and are followed still nearer the centre by cells containing keratohyaline droplets and representing a stratum granulosum, while the centre itself is occupied by horny cells, and by passing on to fig. 16 it may be noted that the more superficially the island is placed in the section the more horny cells it contains, until one reaches the level of the top of the papillæ, when these special interpapillary islands cease, and they are covered with the same kind of superficial horny cells as those which will be described under the heading of the Superficial Epithelium, which can be seen in figs. 10 and 16.

(To be continued).

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ENTAMŒBA HISTOLYTICA: POSSIBILITY OF SPREAD.

The treatment of intestinal infections due to protozoa remains a matter of investigation and discussion. The return of infected soldiers from the Asiatic end of the Mediterranean in large numbers has afforded a unique opportunity of studying the immediate effects upon men proceeding straight from home—that is, from an uninfected to an infected country. In tropical countries where amœbic dysentery obtains and exists as an endemic ailment, it is often after long years of residence in which "climate," malaria, hepatic troubles, intestinal worms, &c., have played a part that an attack of amœbic dysentery supervenes. The former group gives us, as a rule, uncomplicated infections, the latter almost certainly occur after, or along with, a condition of health or infection which complicates and obscures direct pronouncement. The danger of amœbic dysentery is direct and remote not only to the individual attacked, but to the Army and to the infection of the people in Britain. That the disease is conveyed from man to man is undoubted, but the manner of conveyance is not yet scientifically certain. We believe, perhaps we may say we know, that contamination from handling the fæces of persons infected by *Entamœba histolytica* is possible and direct. The examination of dysenteric stools by a doctor, in whom previous exposure was impossible, followed by an acute attack has been several times recorded. No better example is possible than one recorded by the writer, in which a London practitioner who had never been out of England contracted infection from treatment of two children who came under his care. The children came from Aden. One child had dysentery and was sent home. On the voyage the second child developed the symptoms, and was in the acute stage when seen by the doctor in London. As the second child was recovering the doctor himself got ill and ran through a three weeks' course of acute dysentery of the most pronouncedly text-book type. It was assumed that he had during examination of the fæces, by moving them about with a match, infected himself by soiled fingers. Of course, the other channel is by way of contaminated food; but in the instance quoted this was not probable, as no other persons in the home in which were the children from Aden had become infected, although there were other children in the same house. On the other hand, the doctor who suffered did not infect any of his household, although at first no precautions were taken as regards disinfection, &c., of stools; that his wife miscarried whilst well advanced in pregnancy with severe after-effects during her husband's illness may be regarded as a mere coincidence; perhaps not!

Mr. Clifford Dobell, Lecturer in Portistology in the Imperial College of Science, has recently collated the work of the Medical Research Committee, which is published under the heading, "London: H.M. Stationery Office. To be obtained through any bookseller. Price 1s. 6d. net." An unpretentious title, so much so that the information it contains is apt to be hidden away in the dim-lit recesses of official abnegationism. A pity, for it is real knowledge, and should be proclaimed from the house-tops. Amongst a plethora of good work contained in the volume one which is outstanding is that the entamœba may be present in the bowel without symptoms; it is not perhaps altogether a new observation, but the extent to which it prevails is such that when estimating the percentage of persons afflicted with *E. histolytica* who suffer from dysenteric symptoms the number of men infected with *E. histolytica* who present no symptoms nor ever had any is at least equal. Seeing that 18 to 25 per cent. of men who have had dysentery show amœbic infection on arrival in England, and that many more examined who have never had dysentery showed the presence of *E. histolytica* in the stools, there exists a possibility of a great number of men from the Near East, being possible carriers of the disease. This constitutes, seeing the possibility of spread to those who have never been out of England, a national danger which gives some real cause for alarm.

The effects of emetine as a means of permanently destroying the *E. histolytica* is disappointing, for it is stated that but in one-third of the cases only was a complete cure effected by emetine given hypodermically. From a clinical point of view emetine would appear to be a potent remedy in relieving the symptoms of amœbic dysentery in its acute stages and thereby saving life to a remarkable extent. Such being so, emetine has justified its use, and one would be culpable in not doing one's best for the patient if its administration is withheld. With the acute stage over, however, its usefulness is not only doubtful, but the evidence goes to show that the drug is unreliable and that other steps should be taken to combat the after-effects. What these steps should be is another matter, and they are being fully considered by many observers. Some, such as the writer, hold that ipecacuanha root in powder is the best means of combating post-dysenteric effects, that is of either removing the tendency to recurrences of the appearance of the protozoan, or of the colitis which continues to recur even when no amœbæ are to be found. Others, and with good evidence of success, hold that a most useful drug is the double iodide of emetine and bismuth; and Mr. Dobell finds that it requires 36 to 40 gr. of this drug three or four times daily to effect a radical cure. The fact is that ipecacuanha root has been discarded without sufficient evidence; that hypodermic injection being the order of the day in place of administration by the mouth may account for the slur cast on ipecacuanha. There is nothing to recommend the ipecacuanha as a method of administration, seeing the inconvenience it causes by sickness; but, as with salvarsan and other remedies for syphilis, as with Koch's tuberculin in leprosy, the immediate signs and symptoms are removed, but the disease remains; so emetine would seem to stand to ipecacuanha root, inasmuch as the toxæmia for the time being is removed with distinct advantages to the patient; but as these are temporary for the most part there is the danger of neglecting to continue with well-tried remedies which have proved effective in practice as curative agents.

The presence of *E. histolytica* in the intestine without causing dysenteric symptoms may help to explain another much debated subject, namely, that of hepatic abscess in cases in which the patient has not suffered from dysentery. It has been contended by the writer that primary supra-hepatic abscess of the liver is seldom, if ever, preceded by dysentery, and therefore that it is not amœbic in origin. That amœbæ appear later is certain, as they do in any purulent changes in the abdomen, but that the primary trouble is not due to amœbic infection seems probable, for the pus is primarily sterile. The contention may, however, require modification if the *E. histolytica* is present in the intestine without dysentery occurring.

Annotations.

The Cerebrospinal Fluid in Cerebral Meningitis (P. Nobécourt, *Presse Médicale*, October 19, xxiv, No. 58).—The fluid may have cleared up under serotherapy, but the fact that the disease has not been conquered is revealed by the persisting albumin content. In most cases convalescence is on the way when the fluid clears up, and the serotherapy can then be suspended. But in other cases the meningitis keeps up and drags along, and these patients should be studied with special care. The leukocyte count in the cerebrospinal fluid in thirty-eight cases of cervical rheumatism with sciatica showed zero in eight cases; up to ten leukocytes in twenty-one cases; from ten to thirty in five cases, and from 130 to 183 in four cases. Lumbar puncture relieves in these cases and helps to exclude meningitis. The fluid in ten soldiers and two children with meningococcus meningitis showed from 700 to 37,200 leukocytes per cubic mm. at the first three punctures, the days following injections of the antiserum. The number of leukocytes then gradually dropped to from thirty-one to 460 in the course of the serotherapy, and the fluid became limpid after from three to five injections in eight cases. The other four required from seven to twelve injections and the leukocyte count rose and fell again and again. The albumin content was high at first in all the cases, but subsided under serotherapy. When it kept high or ran up again later, the case was liable to be a protracted one. By watching the leukocyte count and the albumin content we can be saved from the danger of stopping the serotherapy too soon.

Serum Treatment of Weil's Disease (*Spirochætosis icterohæmorrhagica*) (Ido and others, *Journal of Experimental Medicine*, November 1916).—Experimentally, the authors show that spirochæticidal and spirochætalytic bodies develop in the blood of the guinea-pig after repeated inoculations which protect the animal from an infection of fresh, virulent spirochætes. They have not yet tested the duration of this active immunity. They undertook the immunization of a horse through inoculation with vaccine. After demonstrating the appearance of immune bodies in the blood of the horse, they proceeded to the active immunization of man. At first they tested the vaccine which was employed for immunizing the guinea-pigs, but unsuccessfully.

Later they prepared a vaccine ten times as strong as the first and with it obtained good results for the first time. Individuals subject to, but who had not had Weil's disease, were inoculated subcutaneously, and tests were made for the immune bodies after a definite period. Pfeiffer's test made with the serum taken before inoculation does not differ from the control test, while that made with the serum drawn after the inoculation shows the presence of immune bodies. The authors are convinced of the existence of a relation between Weil's disease and rats. The infection is transmitted probably from rats to man by means of the urine of the rats, directly or indirectly. On the injection of 0·1 grm. of rat urine, which contains *Spirochæta icterohæmorrhagica*, into the peritoneal cavity of guinea-pigs, the infection arises, while the injection of the liver or the blood of the rats into guinea-pigs does not produce the typical disease.

Abstracts.

TREATMENT OF ACUTE ALCOHOLIC DELIRIUM.[1]

By James J. Hogan, M.D., M.R.C.S.Eng.

Alcohol belongs to the group of the hydrocarbon narcotics, and while it affects all types of tissues, it has a selective action for the fats of the nervous system and liver.

Whether it be alcohol or the altered metabolism produced by alcohol in the human body, the symptoms present represent the effect of this toxic material in the nervous system and liver, and the pathologic changes present may be anything from simple œdema to severe degenerative changes of the fatty type. It must be evident that any treatment, to be of service, must be used in the stages of œdema. As the severe types also suffer from a starvation acidosis, glucose in high concentration was also used intravenously; this not only furnished an available carbohydrate that was readily utilized by the body, but in 30 per cent. concentration produced marked dehydrating effects on the central nervous system.

Case.—J. O. L. was seen at hospital January 2, 1916, at 9 p.m., with a diagnosis of alcoholism with epileptiform convulsions. He had been drinking heavily for years. He went from one convulsion into another after entrance and could not be roused. Blood-pressure at this time was 118. 1,000 c.c. of the following mixture was given intravenously: Sodium bromide, 10·2 grm.; sodium chloride, 5·8 grm.; sodium bicarbonate, 8·4 grm.; and sterile tap water, 1,000 c.c. He was so delirious that it was necessary to keep him in restraint during the administration of the solution.

The urinary examination made before treatment showed a high degree of an acid intoxication, with specific gravity 1·030; reaction acid 10^{-5}, albumin a trace, sugar none, indican marked increase, urobilin increased, urea 20 grm. per 1,000 c.c., ammonia 2·59 grm. per 1,000 c.c., ratio 1 to 7, acetone triple plus, diacetic acid triple plus, hyaline and granular casts present.

On the following day the delirium was less, but it was still necessary to keep the patient in restraint. Urinary examination showed a drop in ammonia from 2·59 grm. to 0·84 grm., but it was still heavily charged with acetone and diacetic acid. Every two hours 1,250 c.c. of a 2 per cent. sodium bicarbonate and 6·4 per cent. glucose solution were given. By 2 a.m. the patient was sleeping soundly. Urine examined after the last intravenous injection and on January 7 (the day of discharge) showed absence of albumin and indican, ammonia down to 0·64 grm. per litre, no acetone, and no diacetic acid. The patient was eating and sleeping well and the tremor was gone. He was discharged on the morning of January 7.

This method of treatment was used in sixty-four cases. Blood-pressure readings have been obtained in fifty-three of the sixty-four cases; this was reduced, despite the fact that the volume of the circulating blood had been increased. It has been maintained that intravenous injections of alkali and salt are dangerous because they raise the blood-pressure, but here the opposite was shown. Despite the fact that the volume of the circulating blood is increased in these conditions of high blood-pressure, if a proper solution be used it is possible to dehydrate the blood and other tissues of the body. If the amount of salt in combination with the water injected is in excess of the normal concentration, it will diffuse into the tissues of the body and liberate water from them. If the salts in solution be sufficiently concentrated, more water may be given off than was injected. The effects of such a procedure are obvious. Not only are all the tissues of the body dehydrated, but the circulating blood as well. If an œdema has been existent anywhere in the body it will therefore tend to be reduced, or, to apply it to this use, if there has been an œdema of the brain, this œdema tends to become reduced. At the same time, that portion of the high blood-pressure which has rested on such an œdema of the brain will also be reduced. The blood also shrinks under the influence of the salt, as do the more solid colloids of the body. This shrinking of the blood colloids means a decrease in the volume of the circulating blood, and this is again followed by a fall in blood-pressure. It is better to use freshly distilled water if it can be obtained, but distilled water that is not fresh should not be used; it is better to use tap water.

In the preparation of the solutions 5·8 grm. of chemically pure sodium chloride and 8·4 grm. of chemically pure sodium bicarbonate are boiled in 120 c.c. of distilled water and filtered through paper, then placed in a flask and reboiled. In addition 10·2 grm. of chemically pure sodium bromide is boiled in 30 c.c. distilled water, filtered and reboiled. These may be kept ready for use, and when needed are added in 850 c.c. of either freshly distilled water or tap water that has been filtered and boiled. Under no circumstances should old distilled water be used, as it produces severe chills. This mixture is heated to about 110° F. and is ready for use.

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[1] Abstracted from the *Amer. Med. Journ.*, December 16, 1916.

The glucose used in the early cases was the anhydrous variety, but on account of the price and our inability to procure it in sufficient quantity, I found that I could prepare the glucose crystals found in the market and that the results were satisfactory. In a flask with 250 c.c. distilled water 80 grm. are placed and boiled. To this is added 0·25 grm. of blood charcoal. This is allowed to stand for twenty-four hours, is then filtered into a clean flask, reboiled, and is ready for use. This solution may be made up and kept ready for use.

Both of these solutions must be given very slowly, from twenty to thirty minutes being taken for the 1,250 c.c.

A small percolator, such as is used in giving salvarsan, with rubber tubing and needle attached, is all the apparatus that is needed.

The after-treatment followed in these cases consisted of active elimination, produced by 0·3 grm. calomel, followed by 30 grm. magnesium sulphate. The diet had to conform to the general hospital routine, and consisted of milk, soup and bread. In private practice I feed my patients sugar in large quantities, and furnish alkali to keep down acid intoxication.

The time of detention is less, the period of delirium much shortened. The patients eat better, they can be trusted to take care of their excretions on account of a much clearer mental condition, and the desire for alcohol is abolished, at least for the time being.

The mortality in this series of sixty-four cases was 9·3 per cent., the average time of detention 2·63 days.

HEALTH LABORATORY ORGANIZATION.[1]

By William H. Park, M.D.
New York.

The opinions expressed are founded on experience as Director of the Health Department Laboratories of New York City for the past twenty-two years, during which time the bacteriologic laboratories have increased from a force of four employees to one of over 200.

The health laboratory in a small city will, from necessity, carry out all the public laboratory work. The health investigations and those required to test contract materials are so varied and are done with such different purposes, that a separation into two distinct laboratories is desirable as soon as the city has become fairly large and the expense can be afforded.

It is apparent that many necessary examinations, such as asphalt to be used in road making, have no relation to health, and should not be charged to the expense of protecting the health of the community, nor should those interested in health problems be compelled to divert their attention to such examinations.

The question of whether it is wise to unite the chemical and bacteriologic laboratories under one head, or to separate them, can only be answered after knowing the local conditions. The same is true as to whether the water examinations should be done in the health laboratory or in one connected with the department of water supply.

Many, without considering, think that the laboratories are something apart from the other divisions of the health department. This is manifestly not so. The bacteriologic and chemical examinations of milk are made for and controlled by the food divisions, and the diagnostic bacterial examinations are a part of the cost of handling the communicable diseases.

The laboratory examinations of water are a part of the work of the bureau controlling the water supplies.

If the production of serums and vaccines is undertaken it relieves the health department from purchasing these products. It would be foolish to provide the means for each division to have a separate laboratory, and so necessarily, for the sake of economy, all these subdivisions are united in a central laboratory.

When the laboratory is small the chemical and bacteriologic laboratories are usually united, but when the laboratory becomes extensive a separation frequently develops, each division being placed in charge of an assistant director, or the general chemical work being removed to the supervision of the food division.

The chemical laboratories in New York have, for instance, sometimes been united with the bureau of bacteriologic laboratories and sometimes with the bureau of foods, the chemist in charge reporting to the director of whichever bureau the laboratories happened to be assigned.

The fact that a laboratory carries on the technical work for all the activities working for the health of the public explains why in the largest cities some of the health laboratory work may be done by separate laboratories not connected directly with the central health laboratory. For instance, the care of the water supply is frequently under a separate bureau of the city. It is often desirable that the examinations made to determine the efficiency of the safeguards should be by a small laboratory devoted solely to the examination of water and reporting directly to the department of water supply. The health laboratories would still do water examinations for other purposes.

National and State Governments, because of different departments, tend to subdivide still further. This subdivision, if not carried too far, is desirable, for in this way the laboratories are responsive to the needs of the departments of which they form a part.

The activities of health departments have broadened greatly in the past twenty years. The New York Board of Health has always regarded that all matters connected with scientific investigation of infectious diseases, as well as routine examinations, were within its province.

This conception of the scope of the duties pertaining to a sanitary board has come to be adopted by all enlightened communities. A percentage of the laboratory budget in New York has always been applied to research investigations. There are the best of reasons for this, outside of any desire to do a part in adding to the general amount of knowledge:—

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, December 30, 1916.

(1) Practical additions are thus frequently made to our knowledge concerning the prevention of disease which can be immediately applied.

(2) Laboratory workers of greater ability can be obtained where some time is allowed for research investigation.

(3) The workers, being of a higher average type and trained to carry out investigation, are better able to test the value of new discoveries, and if found good to adopt quickly the new measures.

The tendency of the times is to demand such records that the cost of each variety of laboratory work can be estimated so as to determine the relative value of different lines of work. Although for most scientific workers this is irksome, still the laboratory must yield to this demand, both because it is probably necessary for efficiency and because it is required by those who control the expenditure of a city's money before approving of its budget.

In the larger laboratories the cost is frequently itemized to cover the separate functions. The bacteriologic laboratories in New York have divisions for:—

	Number of workers
1. Administration	17
2. Diagnosis (diphtheria, typhoid fever, syphilis, &c.)	58
3. Production of serums and vaccines	57
4. Applied therapy (administration of serums and vaccines)	15
5. Microbial sanitary examinations (milk, water, &c.)	22
6. Preparation of mediums	24
7. Special investigations (on practical subjects directly pertaining to the prevention and treatment of communicable diseases)	15

These divisions are in many respects artificial and overlap each other, but they are the best that we have been able to devise. In an active laboratory the subjects under investigation and the practical applications are always shifting.

Those interested especially in the subject of organization and cost accounting are apt to demand that these functions be separated, not only for budget purposes, but actually. If they had their way, the director and first assistant director would confine their time wholly to conferences with the commissioner or medical officer and the heads of the bureaus and to supervision of the other employees. Those holding technical positions would do either routine or research work in one line only.

This separation is, to a considerable extent, necessary. Those doing the routine diagnostic and sanitary examinations are usually not of the type to be able to wish to do investigative work. There are others who have the capacity to do research work, and these should be given the opportunity to give a part of their time to investigation, while at the same time they direct and oversee a considerable amount of routine work. And the salaries of those doing mostly investigative work should be fully equal to the salaries of those doing chiefly administrative work.

The director and first assistant director of the laboratory should be in touch with all the work, and each should take an active part in at least one division of it. The inter-relations between the divisions are usually so many and so close that this general acquaintance with the whole work is essential.

If those in charge did nothing but laboratory administrative work, they would soon cease to be capable wisely to direct it and to estimate the value of its output.

According to the size and complexity of the laboratory, the divisions may or may not be grouped under assistant directors. If the division is large and important enough it may have a chief over it, but if it is small, or while it is in a transition stage of growth, it may be conveniently placed under the supervision of an assistant director having charge of another division.

All of the assistant directors and the workers filling positions of responsibility should know in a general way about the work of all the divisions, so when changes in the force occur the position vacated can be filled by one best fitted to take it up, so that no interval in the efficient carrying on of the examinations and investigations may occur.

The minor workers who have ability should also have some knowledge of at least one other line, so as to broaden their knowledge, increase their interest, and make them available to fill places left vacant by resignation, sickness or vacation.

Frequently the results of some investigator's work may lead to practical application in a different division of the laboratory from the one he belongs to. It will often be in this case for the greatest efficiency of the laboratory to allow a worker to divide his time between two divisions.

The director of the laboratory should be given freedom to arrange those matters that his knowledge of the problems and his force make advisable.

It would certainly be a very narrow point of view to claim that this should not be allowed, because superficially considered it interfered with an easy estimate of functional cost accounting. As a matter of fact, an estimate of the cost of producing antitoxins or of examining a sample of milk can never be obtained from these general reports.

The higher workers should all be expected to do some research work, and some time should be given them to do it. In this way their interest is stimulated and their capacity measured and developed for more important responsibilities.

Many cities and States still hesitate to arrange the budget for the laboratories so as to require a moderate amount of research investigation.

My experience convinces me that the omission of a provision for research along practical lines is a great mistake. The organization of the research branch of the city laboratories was due primarily to

Dr. H. M. Biggs. He is carrying out the same policy as Commissioner of Health of New York State in insisting on and obtaining money for the installation of research laboratory investigations along intensely practical lines in the prevention and cure of communicable diseases.

Those who are familiar with the laboratories, before and since he became commissioner, have no doubt that the slight extra expense incurred for investigation has justified itself in the complete change in the point of view of the laboratory workers and in the increased efficiency of their work.

The great research institutions, like the Pasteur and Rockefeller institutes, have neither the inclination, time nor opportunities to attack many of the public health problems that are pressing on departments of health.

DISSOCIATED JAUNDICE.

Hoover and Blankenhorn (*Arch. Int. Med.*, September, 1916) show that the adsorptive property of plasma for bile salts as well as bile pigments has hitherto not been clearly perceived. Examination of the blood shows retention of biliary constituents in the plasma when none are present in the urine. The plasma may under some conditions, not yet well understood, retain a large amount of bile pigment and yield none of it to the kidney, although the kidney function may be perfectly normal. This adsorptive property of the plasma may hold bile pigment so firmly in its grasp that no pigment will be yielded to the tissues; so the disparity between icterus of the plasma and icterus of the skin may in some few instances be as striking as the disparity between cholemia and choluria. Adsorption of bile salts is not nearly so marked as adsorption of bile pigment, but in primary anæmia, particularly, the presence of bile salts in the plasma without the presence of bile salts in the urine has been abundantly confirmed in the experience of Hoover and Blankenhorn. There may be pronounced cholemia without choluria, and also without icterus of the tissues.

The recognition of these possibilities directs consideration to the subject of "dissociated jaundice," which has formed a topic for discussion in the French clinical literature of recent years.[1] This postulates that the bile pigments and salts may reach the circulation independently of each other. So long as no attention was paid to a careful study of the biliary products in the plasma, there was no guarantee that the apparently separate appearance of either pigments or salts in the urine was not due to some "dissociation" brought by the renal filter rather than by the liver. Thus it is quite conceivable that the kidneys may at times allow the passage of the bile salts while the pigments cannot penetrate them. A true cholemia would thus fail to be accompanied by the appearance of a supposedly diagnostic sign, bile pigment, in the urine. It would not be an instance of true dissociated jaundice of hepatic origin, but merely a separation of two biliary products by renal elimination of bile salts.

Hoover and Blankenhorn insist that when bile salts without bile pigment are found in the plasma we are bound by our present knowledge to assume there exists a genuine dissociated jaundice of hepatic origin, for thus far there is no clinical or experimental evidence to show there can be an extrahepatic origin of bile salts. In all experimental and clinical studies they find no evidence that bile pigment can be eliminated through the kidney and bile salts retained in the plasma. If the two biliary elements are separated by renal elimination, it will always be bile pigment which will be retained in the plasma and not bile salts. They have found true dissociated jaundice of hepatic origin in two cases of primary anæmia and in two cases of lead poisoning. In the four cases bile salts were found in the blood in large amounts—that is, quite as pronounced as in complete jaundice of marked severity.

Excepting in jaundice of hæmolytic origin and in complete jaundice which has undergone renal dissociation, bile pigment was not found without bile salts in the plasma. A few years ago it would have been decided unorthodox to expect bile pigment in either plasma or urine without some liver complication to occasion the perversion. It will become necessary, judging by the present outlook, to abandon the doctrine that there can be no jaundice without the agency of the liver. The investigations have furnished such convincing evidences of extrahepatic jaundice that the possibility of its occurrence can no longer be neglected. Hoover and Blankenhorn are ready with a modified nomenclature for the future. To avoid confusion they use the term "dissociated icterus" to employ a terminology which will indicate the source of the dissociation of biliary elements in the plasma. "Complete icterus" means the presence of bile pigment and bile salts in the blood. "Hæmolytic icterus" implies the presence of bilirubin in the blood without bile salts, when bilirubin is formed extrahepatically. "Hepatic dissociation icterus" implies the presence of bilirubin or bile salts separately shunted into the blood-stream. By "renal dissociation icterus" is meant the presence of bile pigment in the plasma due to separation of the biliary elements through renal filtration of the bile salts.

CONTROL OF LOCALIZED HYPERHIDROSIS

By A. W. Stillians.

Circumscribed hyperhidrosis is a common disorder of the skin which may usually be classed among the petty annoyances of life. Not infrequently, however, especially when complicated by bromidrosis, dyshidrosis, or hyperkeratosis, it assumes a much more important rôle, incapacitating the person for work or pleasure. Walking is made so painful as to be impossible, the use of the hands is similarly interrupted, or the knowledge that an unpleasant odour clings to one makes the sensitive person dread to meet others.

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[1] For a bibliography of the subject see Lemièrre, Brulé and Garban: "Les rétentions biliaires par lésion de la cellule hépatique," *Semaine méd.*, 1914, xxxiv, p. 301.

An efficient and inexpensive local application is aluminium chloride, $AlCl_3.6\ H_2O$, a white deliquescent salt easily soluble in water. Heating changes the crystals to alumina, Al_2O_3, and then to a hard substance resembling colourless corundum. It is incompatible with alkalies, sulphur, phosphorus and selenium.

A 25 per cent. solution of aluminium chloride in distilled water dabbed gently on the part every second or third day and allowed to dry on will cause a rapid amelioration of the excessive sweating. It is usually sufficient to make three such applications, then to wait for a recurrence before resuming treatment; or one application a week may be made to ward off recurrences. Dress shields, which aggravate the trouble by their impenetrability, can often be discarded after a few applications.

The drug is not wholly bland, for excessive use of it will cause a sharp itching or stinging sensation which usually subsides spontaneously if the part is not scratched. Excessive or careless use followed by scratching can easily cause a dermatitis, but never when reasonable care was exercised. To avoid it the patient should be instructed to allow the lotion to dry thoroughly before clothing is permitted to touch the skin, and should be warned against over-enthusiasm in its use. If itching does occur in spite of precautions, an ointment of cold cream containing 12 per cent. boric acid (1 dr. to ounce) may be used, or a calamine lotion with or without 0·5 per cent. (2·5 gr. to ounce) of phenol (carbolic acid).

'Most of them were cases of simple local hyperhidrosis of the axillæ or feet; but three were cases of persistent vesicular eruption of the feet, accompanied by excessive sweating.

CASE.

Mr. B., aged 34, had a chronic dermatitis of the hands and feet, present constantly for the last fifteen years, but varying in severity. The feet always grew worse in the summer time, so that at times he could hardly walk because of the pain. All efforts to relieve the condition, powders, lotions, baths, and special shoes had failed.

On examination, small deep vesicles, in size from that of a pinhead to half a split pea, and the bases of ruptured vesicles were found in considerable numbers over both soles. The lesions were partly discrete and partly grouped, and there was very little accompanying erythema. The eruption was especially marked below the instep and about the toes, and the skin between the toes was sodden, white and thickened. A small patch of papular eczema was seen above one ankle. The socks, which had been worn only a few hours, were soaked with perspiration, without any markedly offensive odour. A search for fungus in the epidermal roofs of several of the more recent vesicles was without result. The general health was good except for a slight albuminuria of unknown cause which he had had for many years. The trace of albumin present at the time of my examination was not accompanied by casts.

The patient was given a small quantity of the aluminium chloride lotion to try cautiously in one of the interdigital spaces. On reporting that this caused no irritation, he was told to apply it over the whole surface of both feet and between the toes once every third day. After a few applications there was great improvement, and in three weeks he was free from signs of the disease. He says that in spite of the unprecedented hot weather this has been his most comfortable summer in the last fifteen years.

Care has always been taken to reduce any active inflammatory eruption before using the aluminium chloride for fear of irritation from it. A few have reported marked itching for a few minutes after applying the lotion, but this has always subsided spontaneously, and no patient has developed a dermatitis.

GUMMA OF THE SCLERA.[1]

By E. M. Blake and J. E. Lane.

The etiology of episcleritis and scleritis is frequently uncertain.

Syphilitic scleritis is not very common, and when it does occur it usually takes the form described as episcleritis or that of deep scleritis, and not that of a gumma. In fact, gummas of the sclera are so rare that they are curiosities. They occur from ten months to eight years after the chancre.

Deep scleritis frequently shows some nodules which are too small and too irregular to be classed as gummas. These nodules are frequently multiple, and the two eyes are frequently affected at the same time. This condition is usually refractory to treatment, and is frequently complicated by opacities in the cornea, iris and vitreous, and by other secondary changes in the other coats of the eye. Recurrent scleritis does not ordinarily have a syphilitic origin, but isolated nodules are sometimes found in the sclera as a result of syphilis. It is very likely that these nodules in rare cases develop into gummas.

CASE.

A. N., man, aged 38, was seen April 15, 1916. About ten months before a small red spot had appeared on the sclera of his left eye, which he at first thought to be due to a foreign body. He had been treated for several months by two different ophthalmologists, and during this time the spot had constantly increased in size and had become more and more painful.

On the temporal side of the left eye, at a distance of about 3 mm. from the margin of the cornea, was an oval tumour measuring about 4 by 6 mm., with the longer axis up and out. The tumour was raised approximately 3 mm. above the level of the surrounding sclera. It was yellowish red, slightly tender, distinctly hard, and covered by dilated conjunctival vessels. The sclera about the tumour was of a slaty blue.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, December 30, 1916.

The clinical diagnosis was either tuberculosis or gumma. There was no history of tuberculosis or of syphilis, though there was a history of venereal exposure. From his description it was thought that he had recently been taking mercury and potassium iodide, probably in insufficient doses to prove a diagnosis. Tuberculin tests were all negative. The Wassermann reaction was strongly positive. As the previous treatment had been ineffective, four injections of neo-salvarsan were given at intervals of one week. These were followed by weekly injections of mercurial oil.

Shortly after the first dose of neo-salvarsan the tumour began to decrease in size, and after eight weeks nothing was left except a slaty blue spot and a few dilated conjunctival vessels. The discoloration has gradually become less, and the conjunctival vessels smaller, though there will probably be some permanent enlargement of them. The other tissues of the eye were not affected, and vision was normal after the pain and tumour had disappeared.

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Notices of Books.

A NATURALIST IN BORNEO. By the late Robert W. C. Shelford, M.A. Edited with a biographical introduction by Edward B. Poulton, D.Sc., LL.D., F.R.S. London: T. Fisher Unwin. Price 15s.

Mr. R. W. C. Shelford, after taking his degree at Cambridge in both parts of the Natural Sciences Tripos in 1895, went to Borneo, where from 1897 to 1905 he lived and studied the fauna of that country. Returning to England in bad health he was unable to compile his notes in book form; but this was undertaken, fortunately, by E. B. Poulton, F.R.S., and the interesting volume before us is the result.

An interesting description of the habits of the orang-utan is given. The animal is still plentiful in Sarawak, though very local in its distribution, being found only along the Simunjan, Balang Lupar, and Rejang Rivers. It is an extremely difficult creature to study, for it is essentially arboreal in its habits, and it moves rapidly along the higher branches of the trees, while the would-be observer can make little or no headway through the thick tropical undergrowth. The author contrived, however, to learn something of the orang's habits, both from wild specimens and from a young one which he kept as a pet for many months, and which he found "cleanly, affectionate, extremely intelligent and amusing." A remarkable photograph of an orang's "nest," or sleeping platform, is given. Little larger than a rook's nest, it is placed among the slender boughs near the top of a moderate-sized tree. The beast "lies flat on its back on its nest, and holds like grim death with hands and feet to the branches in the fork of which the nest lies; and so it passes the night, half-supported by the frail platform, half-suspended by the hands and feet, whose grip is secure even in the deepest slumber." It will be remembered that when the orang "Sally" escaped from her cage in the Zoological Gardens, Regent's Park, her first instinct was to make herself a "nest" in a neighbouring tree.

Two other interesting monkeys of Borneo are the pig-tailed macaque (*Macacus nemestrinus*), which is trained by the Malays to pick coconuts for its masters; and the crab-eating macaque (*M. cynomolgus*), which moves about in family groups, and is so co-operative in its habits that "in cases of difficult parturition the other females act as accoucheuses, with sometimes disaastrous results to the baby." A couple of photographs taken by the author of the Bornean lemur (*Tarsius spectrum*) deserve notice, as the animal is very little known even among naturalists, no specimen having ever reached a European menagerie.

The birds, reptiles, and insects of Borneo, of course, provide wonderful material for the field naturalist, and Mr. Shelford's chapters on these subjects will be read with much interest. They are followed by a section on mimicry, of which the author takes a wise and moderate view, and by three or four miscellaneous chapters dealing with various anthropological questions.

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Notes and News.

DYES: ANNATTO AND CUTCH.

THE shortage of dyes owing to the War is causing careful investigations in many parts of the world. Amongst these annatto and cutch are attracting marked attention. Annatto is a Porto Rican production, and the amount now in the market is trebled in quantity and price since the commencement of the War.

The shrub (a tree)—*Bixa orellana*—grows wild in Porto Rico. The seeds constitute the "annatto" of commerce, and under the local name of achiote is employed in dyeing silk, cotton, and woollen materials; but in this aspect of its use it is not a staple dye, but fugitive rather. It is as a colouring matter for butter and cheese that it is mostly utilized, and almost all butter on the market derives its fine yellow "buttery" colour from the "annatto" added to it. It is not regarded as an adulteration, and its physiological properties are probably *nil*.

Confectionery in many of its forms owes its colour to annatto, but sauces, varnishes and lacquers also in many instances owe their tinge to this harmless ingredient.

Cutch, a Burmese production, is derived from the *Acacia catechu*, and the colouring matter is derived by boiling the chopped tree-trunk, the best qualities being obtained from the heartwood. It is met with in commerce in tablets, blocks and basket, the first-named shape being of the best qualities and the basket variety the least valuable. In addition to its use as a dye, cutch has tanning and preservative qualities of some value, and the Burmese find that nets and sails steeped in a solution of the material have the power of resisting the action of sea-water.

Original Communication.

ACANTHOKERATODERMIA PRÆCORNUFACIENS.

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(*Continued from p.* 28.)

The Papillæ.—The roots of some papillæ as they spring from the corium can be seen in fig. 7, while the top of a papilla is visible in fig. 10; but figs. 15 and 16 are designed in the corium to its termination under the superficial epithelium.

By a study of these latter figures it will be seen that the papilla in question is enormously lengthened and that it is not merely bounded by the interpapillary epithelial areas already referred to, but that it is actually divided by some of these, *vide* fig. 15 b and c.

It will also be noted that at its origin it is thin, while at its superficial area it is broad and subdivided by epithelial bands.

Throughout its course it is composed of fine fibrillar connective tissue which supports many capillary vessels, the walls of some of which are thickened by fibrous tissue. The cellular elements (fig. 6) embedded in this connective tissue are numerous and consist of plasma cells with rare polymorphonuclear and binuclear cells, and very rarely one of Ranvier's clasmocytes.

The stratum germinativum covering the superficial aspect of a papilla consists of more or less cubical cells showing prickles, and is followed by a rete Malpighii composed of large cubical prickle cells with well marked striæ and with a vesicular nucleus, which is often surrounded by a vacuole.

Further outwards (figs. 10 and 16) the prickle cells become very distended by vacuoles, while superficially to these are flattened nucleated cells, which bring us to the extraordinary surface epithelium covering papillæ and interpapillary areas.

The Superficial Epithelium.—If one examines with a hand lens the vacuolated prickle cells, just mentioned above, as depicted in fig. 10, it will be noticed that some of them contain a few granules, which are more numerous in some sections than in others. Separated from these vacuolated cells by the few nucleated cells mentioned above there are a number of granule filled areas bounded by very distinct walls and separated from the next layer by means of a few compressed nucleated horny cells like those previously mentioned from a similar row of rounded areas which, however, show indications of fusion, while separated from them by looser nucleated horny fibres is a space filled with the same finely granular material as the smaller rounded spaces.

The smaller rounded spaces appear to be the descendants of the vacuolated prickle cells and the large granular space to be formed simply by the fusion of these smaller areas, while the nucleated cells appear to be layers of less abnormal horny cells.

Although all the granules in these spaces are fine, still some are coarser than others, as can be easily noted.

Superficially come some more nucleated and partially cornified cells, and superficial to this a confused area of masses of granules not enclosed by any walls and of nucleated compressed horny cells lying in various directions, but this may be an artefact before, during, or after removal of the specimen, as other areas do not show this confusion, but a more regular arrangement of spaces with granules and of compressed nucleated horny cells which continue to the surface.

In our sections there is a certain amount of blood mixed with the very superficial layers, but this is probably due to accidents before or during the removal of the tissue.

The whole process appears to be the formation of vacuolated cells, the contents of which become granular, alternating with compressed nucleated cornified cells, i.e., it is an anomalous form of cornification and as such is a dyskeratosis, but the main features of the sections are the hyperkeratosis and acanthosis.

Ætiology.—This is obscure as we have been unable to see or to grow any causal agent, and we believe the cocci seen by Unna in hyperkeratosis subungualis to be a secondary infection, which brought about the thick infiltration of the subepithelial plate with cells in his specimens which were absent in ours, and we are supported in this view by the writings of Hektoen and Riesman, who invite attention to the fact that hyperkeratoses of the nail bed frequently become softened and foul smelling probably as the result of secondary infection.

Our case showed no signs of this softening, bad smell, or secondary infection.

We therefore have to look for some other cause than organisms, and it seems to us that the outstanding feature common to the hand, the nail, and the foot is the "Acanthosis," and that therefore the primary change, which must be of a metabolic character, probably takes place in these cells causing the hypertrophy and the modified horny epithelium, while its products passing via the lymphatics into the corium may be the cause of the peri- and endarteritis in the vessels of the nail, and the reason of this not happening in the hand and foot may be because the products were able to escape superficially in these regions, while they were prevented from so doing in the third area by the density of the nail.

In other words, we are inclined to look upon the causal agent as being probably metabolic changes in the prickle cells of local areas.

As to what caused this metabolic change in these cells we have no knowledge, but the analogy of allied conditions and the patient's history point to an embryonic origin for the trouble possibly aided by the usual small traumatisms of post-uterine life as regards the hands, nails, and feet.

Pathology.—Notwithstanding the unsatisfactory condition of the ætiology we are in a position to understand more or less the nature of the pathological process at work.

It is quite obvious that there is an abnormal increase of the cells of the stratum corneum, and as these are remarkably coherent, as tested by digestion in pepsin and hydrochloric acid, it is evident that one of the features of the complaint is *Hyperkeratosis*.

The increase in depth of the prickle cell layer associated with the persistence of the striæ indicates the presence of a certain amount of *Acanthosis*, to which, as it is confined by the excessive amount and coherence of the horny cells, must be ascribed the epithelial downgrowths into the corium and the length and branching of the papillæ. The structural changes in the corium, and especially in the papillæ, indicate the action of some irritant which is possibly chemical in nature, possibly derived from the hypertrophied prickle cells.

We therefore have as the principal pathological process an *Acanthokeratodermia*.

The changes seen in the horny cells covering the papillæ of the most advanced stage of the disease are remarkable and recall closely, when considered with the interpapillary condition, the histology of a cutaneous horn.

Unna, in his classical description of these structures, divides their evolution into two stages, viz., a preliminary *Præcornual Stage* characterized by hyperkeratosis and acanthosis, and a *Cornual Stage* remarkable by the slower epithelial growth during which the cornification and the abnormal cohesion of the horny cells increase until the projecting structure called a cutaneous horn is produced.

If Unna's descriptions of cornu cutaneum be compared with those given above a remarkable similarity is seen to exist and forces one to the conclusion that in our present case we are dealing with an allied though somewhat different disease which stops at the præcornual stage or, in other words, with an *Acanthokeratodermia præcornufaciens*.

Apparently Abraham has twice met with a more advanced stage of this complaint in two cases of multiple painful keratoses in children associated with the development of cutaneous horns.

The extract from Abraham's article in Allbutt and Rolleston's "System of Medicine" is as follows:—

"*Multiple Painful Keratosis of Children, with Development of Cutaneous Horns.*—Two cases have been under my care at the West London Hospital. In neither was there any history of anything of the kind in other members of the family. The first case was that of a girl, aged 5, with a number of localized horny thickenings on the hands and feet, some of them on the dorsal surfaces, two or three on the trunk, and one on the thigh. Several had developed into cutaneous horns, and were painful to the touch. The second was in a boy, aged 9, whose growths were still more prominent and exquisitely painful. They were entirely located on the hands and feet."

With regard to the *Hyperkeratosis subungualis* present in our case, we consider that it is essentially the same pathological process as that seen in the feet and palms of the hands, and that the differences which apparently distinguish it from the more evident condition are solely due to the presence of the nail exerting greater pressure and preventing evaporation.

There is, however, an important matter to explain, and that is why the condition does not go on to true horny formation, and this may be due to the effects of pressure on the sole of the foot leading to cracks in the brittle epithelium, while the effect of these fissures may possibly lead to the chronic inflammatory changes which one sees in the papillæ of the foot, while this in its turn may be the cause of the breaking off of areas of epithelium, thus forming the sores. We say this because the papillæ in the hand do not show signs of this chronic inflammation.

To summarize, we believe that all the pathological processes detailed above can be explained as belonging to a modification of the præcornual stage of the development of a cutaneous horn, and therefore we name the complaint *Acanthokeratodermia præcornufaciens*, and as this is a hyperkeratosis we must now consider the various diseases which are capable of being classified under this heading.

The Hyperkeratoses.—The outstanding feature in the descriptions given above is the hypertrophy of the horny cells, and to this and allied conditions giving rise to indurations of the epidermis the ancient Greeks gave the name τύλος. In the eighteenth century Lorry applied this term to the indurations of the epidermis of the foot, which consist either of an aggregation of epidermic lamellæ or of the same with a hard kernel or a small lymph containing cavity. In contradistinction to these affections he described horny cutaneous outgrowths, of which he distinguished "*Callosa*" composed of epidermal accumulations, and "*Verrucæ*," which were a collection of warts, the surface of which hardened as time went on owing to the exposure to the air.

In 1832 Alibert used the term "*Tylosis*" to indicate such complaints as corns and callosities, and in this sense it is still used to-day.

In 1864 Lebert introduced the name "*Keratosis*" for horny affections of the general integument, but at the present time this term is usually applied to the localized follicular hyperkeratoses.

The word "*Hyperkeratosis*" was utilized by Unna to signify those conditions of the skin in which the cells of the horny layer have a less brittle character and a greater coherence than normal, which two characteristics lead to a piling up of scales. The increased coherence is usually tested by the action of pepsin and hydrochloric acid at 40° C.

Hebra and Kaposi divided the hyperkeratoses into those with and those without papillary growth, which, converted into more modern language, means those with and those without *Acanthosis*, which is a term introduced by Unna to signify any proliferation of the cells of the rete Malpighii in which the fibrillary structure is retained.

Thus we have hyperkeratoses without acanthosis, and for these the term *Keratodermia*, synonym *Tylosis*, may be used, while for the varieties with acanthosis we may coin the word *Acanthokeratodermia.*

But these keratodermias and acanthokeratodermias may be further subdivided, as was done long ago by Auspitz, into diffuse and localized, which latter he further classified by their origin into follicular or non-follicular, while the whole group of the hyperkeratoses may be divided into two subgroups according to their ætiology, viz., whether they are primary in nature, or a secondary occurrence in the course of some other disease.

Taking into consideration these various points it is possible to arrive at some sort of a classification on the lines indicated by Auspitz, Unna, Dubreuilh and MacLeod.

All classifications are ephemeral and are merely useful for the purpose of collating our knowledge with the view to the recognition of types of disease, and the proposed scheme is brought forward merely to enable us to compare the disease which we are investigating with allied conditions.

The Hyperkeratoses.

Definition.—Any cutaneous condition in which the cells of the horny layer have a greater coherence than normal as tested by pepsin and hydrochloric acid and thus tend to pile themselves up in the form of horny scales.

(*A*) *Secondary Hyperkeratoses.*—These are hyperkeratoses occurring in the course of other diseases. They may be further classified as follows:—

(1) *Non-follicular.*—Found in leprosy, arsenical poisoning, and hyperidrosis.

(2) *Follicular.*—Found in Lichen acuminatus, Lichen planus, Lichen scrofulosorum, seborrhœic dermatitis, miliary follicular syphilides, and certain forms of acne (acne keratosa and the comedones).

(*B*) *Primary Hyperkeratoses.*—These are cutaneous diseases in which the coherence and piling up of the horny scales are very prominent characters and not merely incidents in some other disease. They may be subdivided as follows:—

(1) *Generalized.*—These are divisible into:—

(*a*) *Embryonic Origin.*—The classical example is the Harlequin fœtus, which is in a condition known as *Hyperkeratosis Universalis Congenita.*

(*b*) *Origin Unknown but showing Hereditary Tendencies.*—Here would come the *Ichthyoses* and Neumann *Acrokeratoma hereditarium.*

(*c*) *Acquired.*—*Pityriasis Rubra Pilaris* which we have met with in the Sudan can be classified in this place.

(2) *Localized.*—The localized primary hyperkeratoses may be divided into the non-follicular and the follicular.

(i) *Non-follicular.*—These are localized primary hyperkeratoses, which were termed keratomata by Unna, and which may be classified as follows:—

(*a*) *Keratodermias or Tyloses.*—These are localized non-follicular primary hyperkeratoses without marked acanthosis and without markedly dilated papillary vessels.

They are *Callus* and *Callositas*, but with regard to the disease called *Tylosis palmæ et plantæ*, which we have observed in the Sudan, Thost states that the papillæ are five times longer than normal while acanthosis as defined above is present. Our Sudanese example was like Unna's specimen and failed to show any marked acanthosis, and therefore it is possible that there may be two stages in the disease, or there may be two distinct diseases grouped under this term.

Here should probably come the disease called *Punctate Keratosis.*

(*b*) *Angiokeratomatas.*—These are localized non-follicular primary hyperkeratoses without marked acanthosis but associated with dilation of the papillary vessels. Two varieties are recognized, viz., the papular called *Angiokeratoma*, and the patchy named *Brooke's Erythema Keratodes.* Possibly Besnier's *Keratodermia Erythematosa Symmetrica* belongs to this division, but we are not acquainted with any literature detailing the histology of this affection.

(*c*) *Acanthokeratodermias.*—In the section on Pathology we have seen that the condition which we have investigated belongs to this section, which may be defined as localized non-follicular primary hyperkeratoses in which the increase of the horny cells is associated with an acanthosis which, however, is not the principal feature of the disease.

Here must be classified the well-known *Cutaneous Horn*, with *Mibelli's Porokeratosis* and *Thost's variety of Tylosis palmæ et plantæ*, and the variety called *Mal de Meleda* from the island off the Coast of Dalmatia.

(ii) *Follicular.*—These are localized primary follicular hyperkeratoses, and to them the term *Keratosis* is often applied.

Some examples are:—

Keratosis suprafollicularis of Unna, better known as *Keratosispilaris* of Brocq.

Keratosis follicularis spinulosa of Unna, better known as *Lichen pilaris seu spinulosus* of Devergie.

Keratosis follicularis vegetans of Darier, often called Darier's disease, and its allied *Keratosis follicularis contagiosa* of Brooke.

From this classification the conditions allied to *Acanthokeratodermia præcornufaciens* can be seen at a glance, and it now behoves us to inquire into its diagnostic characters.

Diagnosis.—The characteristic features of *Acanthokeratodermia præcornufaciens* are the fissured non-erythematous thickenings of the epidermis of the hands and feet with or without a like condition of the nail beds of the same members. On the other hand, these thickenings of the nail-bed epithelium may be the sole indication of the complaint, and for this part of the pathological condition the older term, *Hyperkeratosis subungualis*, has been in use for many years.

Associated with the thickening of the epidermis there is a peculiar loosening and splitting of the thickened epithelium in the affected areas of the feet leading to the formation of sores possessing islands of thickened epidermis separated from one another by deep fissures.

With regard to the differential diagnosis it can be readily separated from the *generalized hyperkeratoses* mentioned above by the fact that its manifestations are localized, and from the *follicular hyperkeratoses*, in that it is non-follicular in origin.

With regard to its diagnosis from the other non-follicular hyperkeratoses, it is easily separable from the *Angiokeratomata* by the absence of dilated vessels, and from the *Keratodermias* by the presence of the fissures and sores, while Thost's congenital hyperkeratosis of the hands and feet is also distinguishable by the surrounding congestion.

It can be differentiated from *Mibelli's Porokeratosis* by the absence of the circumscribing ridge and by the more marked hyperkeratosis and by its non-association with the sweat pores, a fact which separates it also from the allied *Punctate Keratosis*, a description of which we hope to give in a subsequent paper

It can easily be diagnosed from *Cornu Cutaneum*, in that it does not project as a horn from the surface, but it is closely related to this affection, of which it appears to represent an earlier stage complicated in the foot by a chronic inflammatory condition of the papillæ.

From the *Mal de Meleda* it may be distinguished by the absence of the yellow horny plate with black dots and by the absence of hyperkeratosis on the dorsal aspects of the wrists and ankles, and by the fact that no healthy areas of skin are to be seen surrounded by keratosis.

Abraham's *Multiple Painful Keratosis with cutaneous horns* met with in young children, judging by the short account available to us, appears to be merely a more advanced stage of the same disease and to link up the connection between *Acanthokeratodermia præcornufaciens* and *Cornu Cutaneum*, but it differs from both in being painful.

Treatment.—We attempted treatment by cleansing the sore by means of a weak antiseptic dressing followed by removal of the thickened epithelium, first by the means of the knife, and followed by applications of salicylic acid, but the result was only temporary improvement, as, indeed, is what may be expected in a metabolic disease of embryonic origin.

Summary.—We believe that *Acanthokeratodermia præcornufaciens* is a primary non-follicular hyperkeratosis associated with acanthosis, possibly metabolic in origin, and representing in its essential pathological features the præcornual stage of the formation of a Cornu Cutaneum, and that the condition of the nail beds in the fingers and toes is essentially the same condition modified by the presence of the nail, while the sores on the feet are the same condition modified by the chronic inflammatory changes seen in the papillæ, causing the loss of areas composed of thickened epithelium marked out by the deep, and sometimes moderately broad, fissures which occur in this as in many other forms of hyperkeratosis. This chronic inflammation may possibly be secondary in nature, being brought about by the irritation of dirt in the fissures, as it is absent in the thickened areas in the hand.

Acknowledgments.—We gratefully acknowledge the kind information which Dr. Christy has given us with regard to Karondo, and the kind interest which Captain Archibald, R.A.M.C., and Captain Innes, R.A.M.C. (T.), have taken in the preparation of this paper.

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ILLUSTRATIONS.

Most of the illustrations may, with advantage, be examined by means of a reading lens.

PLATE I.

FIG. 1.—Sole of the right foot showing typical lesions. Photograph.

FIG. 2.—Sole of the left foot showing typical and deeply excavated lesions. Photograph.

FIG. 3. Toes showing Hyperkeratosis Subungualis. Photograph.

FIG. 4.—Fingers showing Hyperkeratosis Subungualis. Photograph.

PLATE II.

FIG. 5. Palms of the hands showing the hyperkeratosic areas. Photograph.

FIG. 6.—Portion of a papilla from an affected area on the sole of the foot to show infiltrating cells. × 450 diameters. Photomicrograph.

FIG. 7. Corium, papillæ, and interpapillary areas from an affected region on the sole of the foot. × 30 diameters. Photomicrograph.

FIG. 8. Three islands in the stratum corneum of an affected nail bed. × 100 diameters. Photomicrograph.

FIG. 9.—Part of the rete Malpighii of an affected nail-bed showing an island in the upper right-hand corner and part of the stratum corneum showing two islands. × 70 diameters. Photomicrograph.

FIG. 10. Superficial part of a papilla, with covering epithelium from an affected area on the sole of the foot. × 20 diameters. Photomicrograph.

PLATE III.

FIG. 11.—Section of one of the hyperkeratosic areas on the palm of the hand. × 70 diameter. Photomicrograph.

FIG. 12. A portion of the thickened horny layer from the same area as Fig. 11. × 70 diameters. Photomicrograph.

FIG. 13. Portion of the horny layer from the Hyperkeratosis Subungualis of a finger. × 80 diameters. Photomicrograph.

FIG. 14. Island in the rete Malpighii of a nail-bed affected with Hyperkeratosis Subungualis showing blood-vessels. × 1,250 diameters. Photomicrograph.

PLATE IV.

FIGS. 15 and 16. A series of superimposed photomicrographs magnified 40 diameters to demonstrate the structure of a papilla and the surrounding interpapillary areas in an affected region from the sole of the foot. Fig. 15, d, fits on to Fig. 16, e. For further information see the text.

PLATE I.

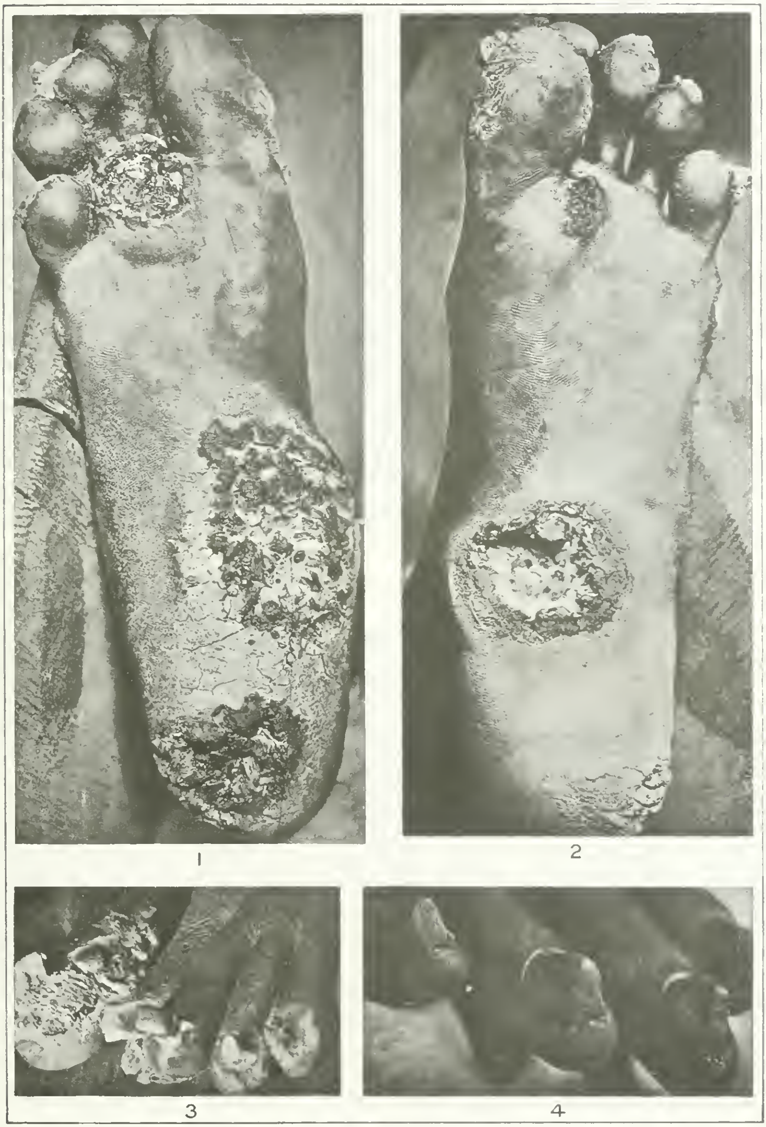

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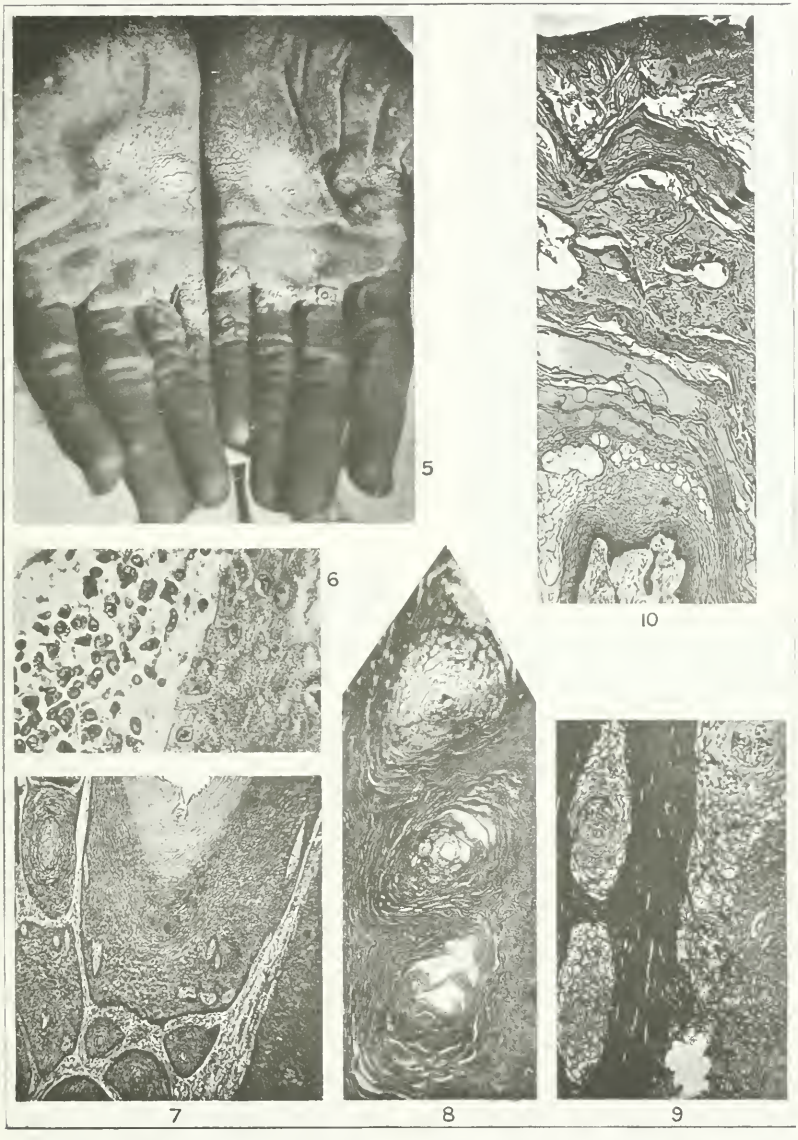
PLATE II.



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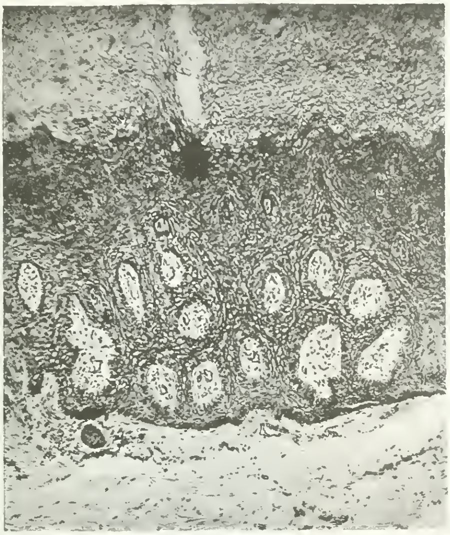

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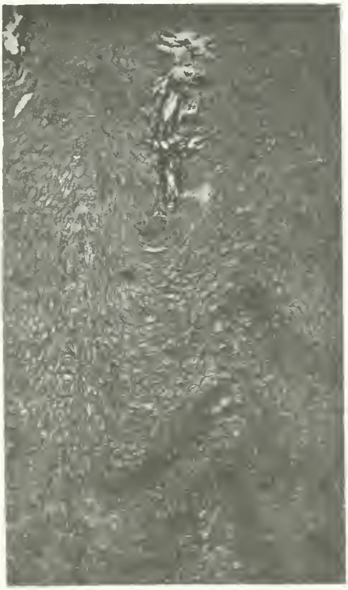

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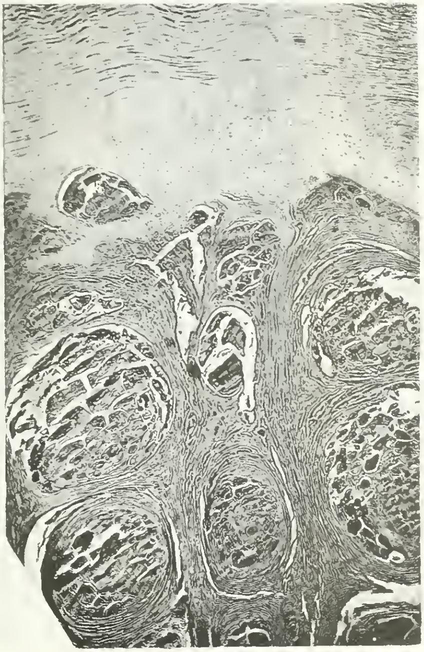

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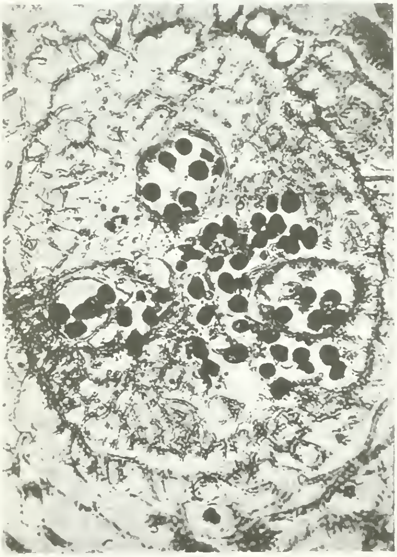

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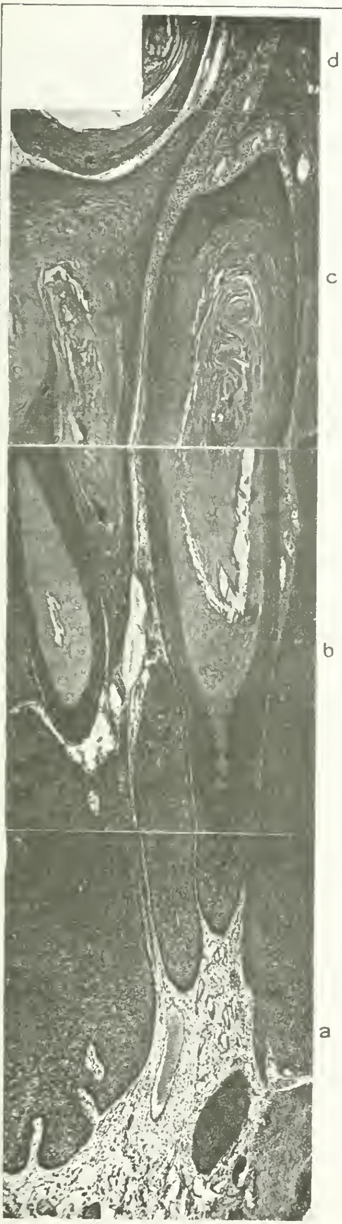
PLATE IV.



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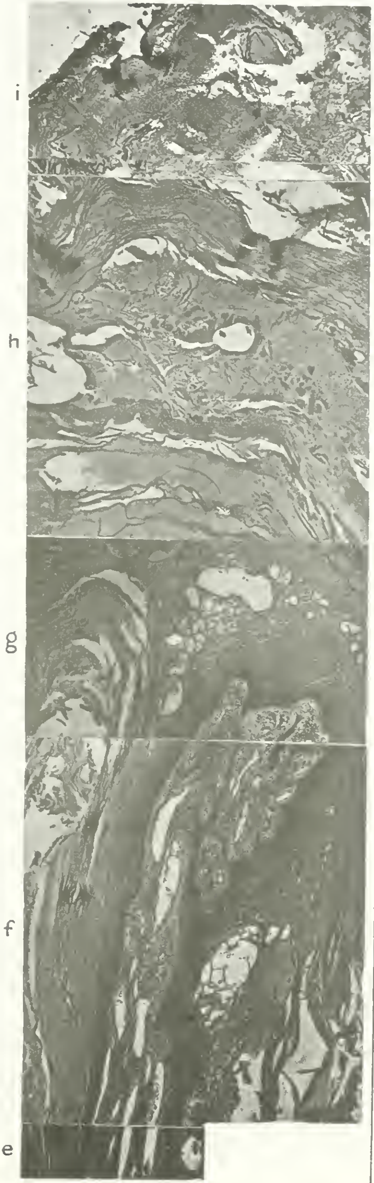

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AN UNHEALTHY CLIMATE.

Is it, or is it not true, that a certain region is unhealthy independently of disease? If it is not true, how is it that in certain districts or whole provinces it is possible for European residents to remain in that region for a short time only without requiring a change to a temperate climate? How comes it about that Europeans taking up work in West Africa require a change home in, say, twelve to twenty-four months, otherwise ill-health is almost certain to supervene? In other parts of the earth—the West Indies, and more especially in the East Indies—Europeans are expected to remain six to seven to eight years before going home for a holiday. It is not that in West Africa more numerous ailments are prevalent; for, compared with the Eastern and Far Eastern towns and districts, more incapacitating ailments prevail in the Asiatic than in the African districts under observation. Dysentery is more rare in West Africa than in India, China, Java, Sumatra, and in the Malay Peninsula. Typhoid, cholera, plague, sprue, and several other diseases prevail in the Asiatic region to an extent unknown in West Africa. Malaria is the one disease common in both, yet it is doubtful if malaria prevails more severely in one than the other. Yet residents in West Africa cannot, as a rule, stand more than eighteen months in that country, whereas in the East six or seven years is considered the normal time for a change. The contention that disease alone is the prohibitive factor to the maintenance of health with the above factors facing us requires some explanation which has not been forthcoming. Is the belief in an unhealthy climate wholly unsustainable? If it is, then how are these differences to be explained?

Are factors at work in one place and not in the other? We have seen that these are not due to the multiplicity of disease, for in the districts where a long stay is possible many more diseases lie in wait for the European. Can the intensity or prevalence of malaria wholly explain matters?

In West Africa getting "run down" is an ever-present condition. What from? Anæmia and destruction of red blood corpuscles prevail to an extent which may be held to account for the condition. What produces the anæmia? Not disease evidently, as far as we can gather. Is it climate? West Africa is for the most part low-lying, moist, and hot, but so are many other places in the Tropics and Sub-tropics. A low-lying district, moist and hot, has a "bleaching" power which is not confined to hot climates; we find it in England in several districts. The inhabitants of the Devonshire vales present the "blood and milk" complexions which we associate with moist and relaxing climates; and in many parts of Britain and in Northern Europe we find similar results. Is there no truth in the terms "relaxing" and "bracing" climates? It is a common belief of so-called unscientific folk. Are we sure that science is not coming into conflict with the storehouse of knowledge gathered by experience? If it does there is no question which belief will prevail, for scientific findings which disagree with common experience have never as yet been capable of being sustained. Science is but the explanation of the accumulated knowledge based on experience, and has not and never can supplant it. To seek for other explanations, there is the question of food and general sanitation. Food in West Africa has been notoriously unsatisfactory and inferior to that obtained and obtainable in other regions under question. There is no doubt some improvement, it may be said considerable improvement, in the matter of food recently. Frozen meat is now more readily obtainable in many centres, and it is hoped good results will obtain; but this so far is limited, and the full benefits have not yet been determined. Given an imperfect or unsuitable diet anæmia and its accompaniments will soon appear, and if present in a moist, depressing, and hot climate it is sufficient to account for much of the evil consequences which prevail amongst West Coast dwellers.

Housing is another factor, and is perhaps the greatest of etiological factors in causing ill-health in West Africa. There is no doubt that improvement in dwellings must be provided if the great detriment to health in West Africa is to be combated; the merchant will find also that it will be money well spent, inasmuch as fewer expensive trips to Britain are required if they will but set about improving the dwellings of their employees.

Yet another item is that of recreation and social life. In the older-established communities in the East and Far East this is obtainable to their immense benefit. Especially is this the case in towns, and as these are more numerous in the East, the possibility of recreation, sport, and social life are more readily obtainable.

In West Africa towns or large communities are few—so few that they affect but in an infinitesimal degree the daily life of Europeans. Tired with close work in a trying climate at the end of the day, with social life well-nigh unobtainable, the European worker leads a lonely life for the most part and becomes introspective, and loses the verve which accompanies companionship.

The absence of women from any community renders social life in the best sense impossible. Something is being done to improve this; the fact that a man finds his environment such as to deny marriage at a reasonable age is detrimental to a degree; it is unnatural, and therefore is sure to produce an unhealthy man physically and mentally.

In considering an unhealthy climate these and several other factors deserve consideration, and each and all contribute their quota of determinental items to bring about what is known as bad health in any climate.

Emollient Cream.

Adeps lanæ hyd.	
Glycerine	
Water	aa 160
Hard soap	6

Dissolve the soap in the water with the aid of heat; add the glycerine. Rub down the wool fat in a warm mortar, gradually add the glycerine soap, stirring till cold. Pass through muslin.

Annotations.

Giant Urticaria (P. Pagniez and P. V.-Radot, *Presse Médicale*, November 23, 1916).—A robust man, aged 29, displayed a slight tendency to corpulence, but had been healthy till March, 1915, when he developed suddenly attacks of œdema coming on suddenly, lasting several hours, and then completely subsiding. The œdema was at times so extreme that the eyes were entirely closed. Chronic, intense urticaria developed at the same time and persisted in variable forms, not a day without some manifestations. Twice the œdema affected the pharynx, and the urticaria was accompanied by pruritus. The disturbances were traced to the food, to albumin from any source, animal or vegetable, but most pronounced after the former. The various methods of treating urticaria, calcium chloride, epinephrin, autohæmotherapy, &c., were given thorough trials without benefit. Finally, an attempt was made to combat the anaphylaxis responsible for the condition by inducing an anti-anaphylaxis according to Besredka's principle of warding off anaphylaxis in serotherapy by giving one or more small doses of the serum an hour before the main injection. The patient was given an hour before the meal a small amount of the albumin of which he was to make his meal. The results surpassed all expectations, the man being thus relieved at one stroke of the disturbances culminating in the urticaria, pruritus, &c. For example, if the meal is to consist of bouillon, boiled beef, macaroni, bread, wine and sweets, the man eats an hour beforehand 5 grm. of boiled beef, 5 grm. potato, and 2 grm. bread. Not a trace of skin trouble follows. Practically the same meal, taken an hour after a preliminary ingestion of 6 grm. of potato alone, is followed by severe manifestations of urticaria.

Further study of the case showed that it was possible to ward off the anaphylaxis with preliminary ingestion of derivatives of albuminoid substances, such as ordinary peptone. This answered the purpose of the desired anti-anaphylaxis, which rendered the task much more convenient for the patient. It was found that under this preliminary ingestion of a sample of the food to be eaten an hour later, or taking peptone instead, the blood no longer showed the typical anaphylaxis changes but behaved like normal blood, developing the leucocytosis of digestion as under physiologic conditions, instead of the reverse drop in the leucocytes during the anaphylactic crisis. The latter occurs in two phases: first, the drop in arterial pressure, the inversion of the leucocyte formula, the change in coagulability, and the pruritus; secondly, the skin changes, which come on and persist for many hours, testifying to the intensity of the shock to the organism. In conclusion, it is suggested that possibly this case may have a lesson for the treatment of hay-fever and asthma by preventive anti-anaphylaxis. The patient in the case reported still has his urticaria, &c., when he omits to take the preliminary dose of exactly 0·5 grm. peptone or small amount of the food to form the meal, and the interval has to be exactly one hour. At the same time it is evident now that the urticaria is growing less severe than it used to be. Dietary anaphylaxis was treated by anti-anaphylaxis.

Treatment of Bacilli Carriers (Herz, *Wiener klin. Woch.*, October 11, 1916).—The stools and urine were examined for bacilli daily or on alternate days, in order to detect any possible connection between the elimination of the bacilli and clinical manifestations. It was ascertained that any intercurrent febrile affection seemed to check the elimination of the germs. This suggested that an artificially induced rise in temperature might have the same effect. To induce this, the corresponding vaccines were given a trial, but did not prove effectual. Then injection of a protein was tried; milk seemed to answer the desired purpose. This induces a therapeutic fever in hæmophilia, pernicious anæmia, leukæmia, &c.; 10 c.c. milk, boiled in the water bath, injected into the gluteal muscle. About eight or ten hours thereafter the temperature rose sometimes with a chill; it kept high for two or three hours and then dropped back to the previous figure. No by-effects were noted except slight headache in some cases. The rise in temperature was moderate, and variable in different patients and at different times in the same patient. No such temperature response was obtained as is the rule in blood disease. In the bacilli carriers, besides the fever, it was noted that the bacilli were driven out into the blood and some were eliminated in the urine. The blood picture was also modified, and there is reason to assume that any local inflammatory process was increased. These phenomena are accompanied by mobilization of antibodies, and these various factors seem to combine to eradicate the lurking bacilli in the body and put an end to the "carriership." Of course, time alone will show whether the parenteral protein treatment gives durable results. To date, the stool and urine findings have been constantly negative in four chronic cases given four or five injections. In the recent cases one injection sufficed. The reaction is comparatively insignificant, the disturbances being less, as a rule, than even those from antityphoid vaccination.

Sodium Iodide (A. A. Da Matta, *Brazil Medico*, September 2).—This drug at first, from the pharmacist's point of view, is a means to detect adulteration, &c. Its administration generates nascent iodine in chronic ear and throat disease, and by intravenous injection stimulates vital functioning and repair. For local treatment equal amounts of a concentrated solution of sodium iodide and a solution of hydrogen dioxide of twelve volumes are used. For the ear, instillation of five drops of the sodium iodide solution, and followed at once with five drops of the other solution. For the nose and throat, the two fluids are applied alternately in the form of spray, or the patient gargles first with one and then at once with the other alternately. This local treatment is effectual both in prophylaxis and treatment. For intravenous injection a 10 per cent. solution is used, gradually increasing the dosage from 1 grm. upward. The usual limit is 20 grm. Clinical experience with it has been very favourable, especially for tuberculous glands and tropical buboes, in heart disease, tendency to angina pectoris, and arterioclerosis in general, as the drug dilates the blood-vessels, and thus reduces the arterial tension. It facilitates secretion in the bronchi, and is useful as an adjuvant in "scrofula," in rebellious internal syphilis, gout and asthma. and in rheumatism of all kinds. Associated with the salicylates it is particularly valuable in acute rheumatism.

The Suprarenal Phenomena with Vaccination against Typhoid (M. Loeper, *Presse Médicale*, October 19, xxiv, No. 58).—In six cases the evening or the day following the first antityphoid vaccination the men grew pale, with cyanosis, pains in the legs and lumbar regions, low blood-pressure and diarrhœa—all signs of asystole of suprarenal origin. The immediate and complete subsidence of all these symptoms under a dose of epinephrin by the mouth or subcutaneous injection confirms the assumption that some transient upset in suprarenal functioning is responsible for them. He has noticed also that the simple or triple vaccination induces signs of suprarenal insufficiency in many cases, asthenia, the "white line" and low blood-pressure. The latter was pronounced in twenty-six of thirty soldiers tested for the purpose, and it persisted for a day or so. This reaction is less intense after each injection of the vaccine. Experiments on guinea-pigs confirmed the suprarenal origin of these symptoms. Before vaccinating against typhoid, in future we must examine not only the kidneys, liver, heart and lungs, but also the resisting power of the suprarenals. This can be estimated from the blood-pressure. The vaccination should never be done on much fatigued men. If the blood-pressure is low, a dose of epinephrin had better be given a few hours before the vaccination, and again a few hours later in case the blood-pressure keeps low or drops lower.

Chinese Preserved Eggs (K. Blunt and C. C. Wang, *Journ. Biological Chemistry*, December 16).—Pidan, a kind of Chinese preserved eggs. The Chinese and other Oriental people preserve eggs, not necessarily to keep them unchanged, but to make various new substances—a process analogous to the production of cheese from milk. The literature on the subject is limited. The following changes have been shown to take place during the formation of pidan from fresh ducks' eggs: (1) Water in large quantities has been transferred from the white to the yolk, and water has been lost from the white to the outside; (2) the ash and the alkalinity of ash have increased in a way similar to that of other eggs preserved in alkali; (3) the ether extract has decreased and its acidity is high; (4) both total and lecithin phosphorus have decreased; (5) the non-coagulable nitrogen has increased and also the ammoniacal nitrogen, the latter to an extraordinary degree, and the amino-nitrogen is high. From these changes the conclusion is drawn that decomposition of the egg protein and of the phospholipoids has taken place. The production of pidan from the fresh eggs is probably brought about through the agency of the alkali, bacteria and enzymes.

Foreign Body in Tumour of Anterior Abdominal Wall (C. K. P. Henry, *Canadian Medical Association Journal*, December, 1916).—An ill-defined mass, the size of a hen's egg, just below and external to the umbilicus, was in the abdominal wall, attached to and movable with the contractions of the right rectus muscle. The mass was considered to be a tumour arising from the rectus sheath, likely a fibroma. On attempting to excise the growth, it was found softer than expected and was torn through; a soft centre of inflammatory tissue was exposed, and, sticking upright in this, a pointed object was seen which was pulled out with artery forceps. This was a fish bone, about 1½ in. long, the sharp point nearer the skin surface and lying perpendicular to the plane of the abdominal wall. The mass of inflammatory tissue was dissected free and down through the rectus sheath and muscle to the peritoneum, a portion of which had to be removed with the tumour. Underlying this piece of peritoneum was adherent omentum which had to be tied off. At no point was there any adherent bowel, and no hernia existed.

So-called Bacillary Affections and Congenital Syphilis (J. Vergely, *Journal de Médecine de Bordeaux*, November, 1916).—Among soldiers sent to recuperate at the seaside there were about a hundred who came labelled *Adénite bacillaire*. The glands involved were in order of frequency after the neck, in the groin, axilla, peritoneum and mediastinum. Some had been suppurating for months. Teeth, eyes and ears were examined for stigmata of inherited syphilis. When other children had died young, or the patient had ever had syphilis, or anything suspicious of syphilis, very vigorous specific treatment was instituted. The mercury was pushed almost to the limit for a month or two, and the long rebellious glandular lesions subsided promptly. The domain of syphilis is being enlarged more and more every day, and this is fortunate, as syphilis is curable. Even when tuberculosis or other affections are associated with it, getting the syphilis out of the way is important progress toward the cure of the whole.

Value of Temporary Cholecystostomy in Gastric Surgery (L. L. McArthur, *Journal-Lancet*, December 15, 1916).—In those cases of stomach surgery complicated by the need of biliary fistulæ, whether gastro-enterostomies with or without excision of ulcer, resections of the stomach for malignant disease, or resection of ulcer-bearing areas, he obviates serious complications by the utilization of a temporary biliary fistula made in the normal gall-bladder. A double purse-string suture, inverting around a small rubber tube the fundus of the gall-bladder, and bringing out the same tube through the abdominal incision or through an appropriately placed stab puncture, complicates the stomach surgery but little more than the making of a stab puncture through the abdominal flank for peritoneal drainage. This has been done for the past two years in many gastric operations. During the early post-operative hours, the bile being allowed to escape externally, fails to disturb the more or less paretic stomach.

Nephrosclerosis.—This term is applied by Löhlein (*Medinzinische Klinik*, October 1, xii, No. 40) to progressive contracted kidney from sclerosis of the arterioles. The prognosis is grave from the moment when the athero-sclerosis is fully developed. From then onward the affection must be regarded as malignant, menacing at any moment, although clinically it is impossible to tell when this occurs.

Abstracts.

CHRONIC SPLENOMEGALY IN LOWER BENGAL, WITH SPECIAL REFERENCE TO THE PREVALENCE AND CLINICAL DIFFERENTIATION OF KALA-AZAR.[1]

By Sir Leonard Rogers.

Spleen Puncture.—Precautions are: Firstly, spleen puncture should not be performed if either ascites, a very high degree of anæmia, such as over under 1,500,000 red corpuscles, which is rare in kala-azar, a strong tendency to hæmorrhages from the nose, gums, &c., jaundice, or any serious complication, such as pneumonia, is present. Secondly, 20 gr. of calcium chloride should be given the evening before and repeated shortly before the puncture, as fine a needle as has sufficient strength used, and pressure with a pad and bandage immediately applied, the patient being kept in the recumbent position for twenty-four hours after the operation. In the present investigation sixteen cases of splenomegaly were not punctured for one or other of the above reasons, seven on account of ascites, five for severe anæmia of from 710,000 to 1,260,000 red corpuscles, while two had broncho-pneumonia which ultimately proved fatal.

The Proportion of Splenomegaly Cases showing Kala-azar Parasites.

The results of my prolonged investigation will be most clearly brought out by embodying the data in a series of tables illustrating the various points to be discussed.

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[1] Abstracted from the *Indian Medical Gazette*, January, 1917.

Table I.—Splenomegaly Cases with and without Kala-azar Parasites Classified according to the Degree of Leucopenia.

Ratio of white to red corpuscles	With kala-azar parasites			Without parasites	
	Number	Percentage		Number and percentage	
−1 to 1,500	33	50·0	80·3	13	48
+1 ,, 1,500 −1 ,, 1,000	20	30·3		25	
+1 ,, 1,000 −1 ,, 500	10	15·5		43	57
+1 ,, 500	3	4·2		41	
Total	66				100
Percentage	39·8				60·2

Patients coming for admission with considerable enlargement of the spleen were taken into the ward whether they actually had fever or not. A good many showed no rise of temperature while in hospital. Still it is surprising to find that in only 39·8 per cent. were kala-azar parasites found, as the patients were all sent in as probably cases of that disease, while the great majority of them had greatly enlarged spleens. It appears that in any patient coming to hospital for the treatment of enlarged spleen in Lower Bengal the odds are against the presence of active kala-azar in the proportion of about three to two. I say active kala-azar, because in our present state of knowledge it is impossible to say how many of the negative cases may be recovering, kala-azar not showing parasites by an ordinary examination of spleen puncture blood. I commenced making cultures for the Leishman-Donovan bodies from the spleen blood in the hope of recognizing a few more cases by this means, but have not yet been able to find time to adequately test this method of research. The fact that in only two-fifths of the splenomegaly cases were kala-azar parasites found greatly emphasizes the necessity of a careful study of this class of cases which is the purpose of this paper.

The Diagnostic Value of Leucopenia.—50 per cent. of the cases which were positive as regards finding the parasite of kala-azar showed the high degree of leucopenia of less than 1 white to 1,500 red corpuscles, against only 18 per cent. of the negative cases, or three to one in favour of a diagnosis of kala-azar. In not a single one of the negative cases showing this high degree of leucopenia had the fever lasted for less than one year before admission, while in a considerable majority of the kala-azar cases the fever had lasted less than one year. It thus appears that this high degree of leucopenia appearing within a year of the onset of the disease is practically diagnostic of kala-azar. Further, 80·3 per cent. of the kala-azar cases showed less than 1 white to 1,000 red against 43 per cent. of the negative cases, so that with even this degree of leucopenia it is two to one in favour of diagnosis of kala-azar. On the other hand, normal counts, ranging from over 1 to 1,000 to under 1 to 500, were met with in only 19·7 per cent. of the positive cases (in over two-thirds of which the fever had lasted less than one year), against 57 per cent. of the negative cases. Thus with a normal or high leucocyte ratio the odds are three to one against the presence of active kala-azar.

Nevertheless, there are still a considerable number of cases in which this test fails to be of much diagnostic value, while the instruments and time required even for such counts are too frequently not available.

The Degree of Enlargement of the Spleen and Liver.—It was expected that a considerable preponderance of the cases with spleen extending to beyond the navel would show kala-azar parasites on spleen puncture, but the very reverse proved to be the case. Thus in 62 per cent. of the negative cases the spleen extended to below the navel against 51·5 per cent. of the positive ones, while twice as many of the former as of the latter reached to 2 in. or more beyond the umbilicus. The degree of enlargement of the spleen then is of no diagnostic value in the recognition of active kala-azar.

The liver is more frequently enlarged in kala-azar than in cases of splenomegaly, in Bengal not showing the parasite of that disease, for in 41 per cent. of the latter the liver was not enlarged to below the costal margin, against 27·3 per cent. of the active kala-azar cases. On the other hand, the percentage of cases in which the organ extended to 2 in. or more below the ribs were nearly equal with a slight excess in favour of the negative series, so the precise degree of enlargement of the organ is of no diagnostic value.

The Nourishment of the Patients as shown by their Body Weights.—Clinically the most characteristic feature of kala-azar is the great and progressive emaciation which occurs in advanced cases, which frequently enables a case to be suspected at a glance by an expert. Moreover, in cases with active fever, persistent loss of weight continues in spite of a liberal diet.

Thus, while nearly one-half (44·2 per cent.) of patients of 18 years and upwards without kala-azar parasites weighed over 100 lb., only one-sixth (17 per cent.) of the kala-azar cases reached that figure. On the other hand, over one-half (51·1 per cent.) of the positive cases scaled under 91 lb., varying from sixty to ninety against only 28 per cent. of the negative cases. In boys under 18 years of age a very similar relationship is seen to hold good.

The variations in the body weight are striking, for nearly half the kala-azar cases (45·5 per cent.) showed loss of weight while in hospital, against one-fourth (25 per cent.) in the negative cases, while only one-third (33·3 per cent.) of the kala-azar cases gained weight against over one-half (52 per cent.) of the negative ones.

It therefore appears that low body weight for the age of the patient is much in favour of a diagnosis of active kala-azar, while if the patient continues to lose weight under treatment this suspicion will be materially strengthened.

The Temperature Curve.

No single point, apart from the leucopenia, will give more than a fair probability of arriving at a correct diagnosis of kala-azar from other forms of chronic splenomegaly. There remains for consideration the course of the fever, which includes the history of the illness previous to admission and the temperature curve while under observation in hospital. As all the indications derived from the foregoing analysis point to chronic malarial enlargement of the spleen as by far the commonest form which has to be distinguished from kala-azar, so we find in the temperature curve the most likely solution of the problem under consideration. The following data will suffice to prove that this is correct.

The History and Duration of the Fever before Admission.—The most important point in the history of the illness previously to admission is the duration of the fever, classified in accordance with the degree of leucopenia, for reasons already explained when discussing the diagnostic value of the leucocyte count.

The most striking point brought out is that the duration of the fever before admission is much longer in the cases not showing the parasites than in the positive cases. Thus in no less than 52 per cent. of the negative cases there was a history of fever on and off for two years and over against only 12·1 per cent. in the kala-azar cases, while in only two (3 per cent.) of the positive cases had the fever lasted three years or over, against no less than 34 per cent. of the negative cases. On the other hand, in only 26 per cent. of the negative cases had the fever lasted less than one year against 60·6 per cent. in the kala-azar series. We thus see that, whereas great enlargement of the spleen within less than one year is much in favour of a diagnosis of kala-azar, on the contrary a previous history of fever for over two years, and still more for three years and over, in a case of splenomegaly is very much against the presence of active kala-azar being present.

Other points of interest and importance in the histories of the previous illnesses are the following: A history of fever without intermission for several months was three times as frequent in the kala-azar cases as in the negative ones, while a history of a double daily rise of temperature was four times as common in the kala-azar series, in several of which it was recorded as not having been checked by quinine. On the other hand, repeated periods of apyrexia were three times as frequent in the negative as in the positive series, and in 12 per cent. of them quinine is stated to have checked the fever. A history of deaths from fever with enlarged spleen was more frequently recorded among the relatives of the kala-azar cases, and one of non-fatal febrile attacks in the negative series. Epistaxis was more frequently noted in the positive and bleeding from the gums in the negative cases, but the differences were not very great.

The foregoing data regarding the course of the fever before admission obviously point to the conclusion that the majority of negative cases with very prolonged history of fever on and off were relapsing malaria, with chronically enlarged spleens.

The Course of the Temperature Curve while in Hospital.—Lastly, we come to the actual records of the temperature curves of the two series of cases while under careful observation in hospital, which necessarily furnish more accurate data than the histories of the previous illness.

The most constant and striking feature of kala-azar is the persistence of fever of varying degree, and especially the failure of quinine to stop the daily rise of temperature, although it may to some extent diminish its range. It is well known that the temperature curve of kala-azar is very variable in its course with frequent intervals of comparatively low fever, but it is of interest and importance to note that, if the temperatures are carefully recorded, the intermissions are commonly incomplete even for a single day for months together. Thus one European patient in the General Hospital during a whole year never passed a single day without a rise of temperature having been registered, although he ultimately recovered, while it is the general rule for fever to continue thus for months on end, although this is very rare in any other fever which could well be confused with kala-azar, with the possible exceptions of extremely prolonged typhoid fever and of Malta fever, in neither of which is the spleen enlarged as much as in chronic cases of kala-azar. In chronic malaria, in particular, frequent apyrexial intervals of days or weeks occur in the course of fever quite apart from any treatment, in which respect its temperature curve differs most strikingly from that of kala-azar.

The outstanding feature is that, while only a single kala-azar case ran a normal temperature curve while in hospital, no less than 51 per cent. of the cases which were negative on spleen puncture had no fever while in hospital. Moreover, in 31 per cent. or more of the negative cases the fever ceased under simple treatment, usually quinine, while in only seven, or 10·6 per cent., was this the case in the kala-azar series, although the latter were kept in hospital much longer on the average than the negative cases. Thus in 82 per cent. of the negative cases the temperature was either normal throughout or fell to normal while in hospital, against only 12·1 per cent. of the kala-azar cases, while in 87·9 per cent. of the positive cases the fever continued under treatment in hospital against only 18 per cent. of the negative series. These figures alone suffice to prove the great diagnostic value of the temperature curves, but the more detailed study below will show that they still under-estimate its importance.

The degree of fever is also not without significance.

Thus a remittent type of fever was present in 25·6 per cent. of the kala-azar series, and in only 10 per cent. of the negative ones, while in only 30 per cent. of the negative cases did the temperature rise above 100° F. against 80·3 per cent. in the kala-azar series, but are minor points compared with frequent absence and early cessation of fever in the negative cases.

The Duration of Fever and the Effect of Treatment.—The variations in the temperature curves in the two series of cases show, firstly, with regard to the duration of the fever under treatment: In the kala-azar series the shortest periods in which the temperature ceased were fifteen and twenty-seven days respectively, while in the remaining five cases in which it reached normal while in hospital, the fever lasted for from one to two-and-a-half months before ceasing. The data regarding the negative series of cases present a great contrast to the above. Thus of the thirty-one cases in which the temperature fell to normal while the patients were in hospital, in only eight did the fever continue for more than one week, and in only two of these had quinine been given. In the majority of the cases in which the fever ceased within a week quinine had been given, and in all of these it stopped within five days. These figures are most significant in view of the fact that in over 200 cases of malarial fever verified by finding the parasites, in no single case did the fever persist for over five days on 20 to 30 or more grains of quinine a day. There is thus the most striking contrast between the positive and negative series in this respect, for whereas in no single kala-azar case did the fever stop in less than fifteen days, out of thirty-one negative cases in which it ceased under treatment, in only two, both untreated with quinine, did the fever last for as long as a week. This clearly points to the negative cases having been nearly all malarial in nature, although in only a few of them were the parasites found, chiefly the benign tertian form, partly on account of devoting very little time to search for them, and partly because in two-fifths of them only low intermittent fever not exceeding 100° F. was present, which is not uncommon in chronic malaria without parasites in the peripheral blood. In malarial cases with enlarged spleen and parasites in the peripheral blood the organ becomes reduced much more rapidly than in kala-azar cases; so it is of interest to record that among eight cases not showing kala-azar parasites in whom the temperature soon fell to normal, but who were kept in hospital for a month or more, in seven the spleen became reduced in size, and the remaining case was unchanged. This also lends support to the view that these cases were probably malarial, as in kala-azar the spleen only very slowly becomes reduced, even in recovering cases.

The negative cases in which the fever did not stop while the patients were in hospital, which was not infrequently only a short time, numbered only eighteen out of 100. In ten quinine was not given, and in one more it was only ordered two days before the patient left hospital, so it is not possible to say how many of these were malarial in nature, but the previous histories of most of them indicated a malarial origin. In the remaining seven cases the fever persisted for over a week in spite of quinine, so these may possibly have been cases of kala-azar in which a single spleen puncture failed to reveal the parasites; occasionally a second puncture is positive when the first had been negative; usually on account of blood from a venous sinus having been obtained with little or no spleen pulp. This view is supported by the fact that six of the seven cases continued to lose weight while in hospital.

To sum up, in only seven of the 100 negative cases did fever persist for over a week under quinine treatment, while in seventeen more in which quinine was not given (including one in which it was only ordered two days before the patient left hospital), the temperature continued for over seven days. No less than thirteen of the last seventeen gave previous histories of repeated malaria-like attacks on and off, as is so commonly met with in chronic malarial splenomegaly, while in one the history was doubtful, and in the remaining three it was more like that of kala-azar. If we add these three last cases to the seven in which the fever persisted for over a week under quinine, we have a total of ten cases out of 100 negative spleen punctures in which the disease may possibly have been kala-azar, while the remaining thirty-nine cases presenting fever in hospital were probably chronic malaria.

Of the fifty-one cases presenting no fever while in hospital, the majority gave histories of malaria-like attacks on and off for two or more years, and were almost certainly malarial in nature. A few of the remainder were no doubt recovered kala-azar, as one presented a normal blood count and was well nourished, although two years before he had been in the same hospital for typical kala-azar, when I had found the parasites of that disease by spleen puncture, although it was now negative. The available data will not allow of any reliable opinion being formed as to the frequency of such cases, but in view of the well-known deadly nature of kala-azar it is probably small.

As they showed no fever they are not of much practical importance from the point of view of this paper.

Summary of the Diagnostic Value of the Temperature Curve.—Two propositions sum up the diagnostic value of the temperature curve:—

(1) Cases of chronic splenomegaly in which the temperature falls to normal within a week on adequate doses of quinine (20 to 30 gr. a day) are almost certainly not kala-azar, but are probably malarial in nature.

(2) In cases of chronic splenomegaly in Lower Bengal in which fever persists for over a week in spite of adequate doses of quinine, the probability of the disease being kala-azar is so great that the specific treatment with tartar emetic intravenously should be commenced without delay.

Does Splenic Anæmia or Banti's Disease occur in Lower Bengal?—Many of the cases of splenomegaly without fever showed varying degrees of anæmia, which raises this question, to which it is not possible to give a definite answer, especially in view of the uncertain position and definition of Banti's disease. In two patients with much enlarged spleen and anæmia without fever or leucopenia, in which the patients themselves asked to have the organ removed splenectomy was performed. Both recovered from the operation, and in one the blood improved considerably, and he left hospital apparently benefited. The other patient got into a low condition with bed-sores and died after several weeks. There is much scope for such operations in Calcutta.

It is of interest to note that chronic kala-azar may produce ascites, as the African form of the disease occurs in some parts of Italy, so that it is just possible that some of Banti's cases were of this nature. In one case in which the spleen was removed in kala-azar a temporary increase of the leucocyte occurred, but fever returned and proved fatal within a few months.

Treatment.—Over twenty consecutive cases have been cured. A 2 per cent. solution of tartar emetic should be injected intravenously two or three times a week, beginning with 3 or 4 c.c., and increasing by 1 c.c. at each dose until 7 to 8 c.c. are reached in adult Indian patients and 10 c.c. in Europeans. Great care must be taken not to let a drop escape around the vein, or intense pain followed by sloughing will result. A month or more usually elapses before the temperature is controlled, when the body weight is rapidly regained, and the spleen eventually decreases and even disappears beneath the ribs.

In the hope of finding a simpler method of treatment, I have tried extensively antimony oxide in glycerine according to Martindale's formula daily, but the results were very inferior to tartar emetic intravenously, as is also antimony ointment inunction, although both have been occasionally followed by cures as verified by spleen puncture.

CONCLUSIONS.

(1) In view of the uniform success I obtained in the treatment of kala-azar in Europeans by tartar emetic intravenously, simple clinical rules for the differentiation of that disease from chronic malaria and other forms of splenomegaly are much to be desired.

(2) Spleen punctures in 166 cases of chronic splenomegaly cases in Lower Bengal have revealed the parasites of kala-azar in only 40 per cent. Of 114 cases showing fever while in hospital Leishman-Donovan bodies were found in 57 per cent. The disease was more frequently contracted in Calcutta than in rural areas as compared with chronic malaria. Beyond Calcutta, the Presidency and Burdwan Divisions are most infected with kala-azar, while the Rajshahi Division and Bihar yielded the next largest number of cases.

(3) The size of the spleen and liver, the degree of anæmia, and the seasonal incidence of the admissions afford no material help in distinguishing between kala-azar and chronic malaria, which have been so hopelessly confused for the last century in Eastern India.

(4) Great leucopenia, such as less than 1 white to 1,500 red corpuscles, is greatly in favour of kala-azar, and if the fever has persisted for less than one year, it is practically diagnostic of that disease.

(5) Marked loss of weight, especially if it continues under treatment in hospital, is much in favour of kala-azar as against chronic malaria.

(6) In cases of spenomegaly, a history of fever on and off for three years or more is almost diagnostic of chronic malaria as against kala-azar.

(7) The temperature curve affords the greatest diagnostic aid in chronic splenomegaly in Lower Bengal. If fever is absent, or ceases within seven days with or without quinine, active kala-azar can practically be excluded; while if fever persists beyond a week in spite of 20 to 30 gr. of quinine a day, the case is so extremely likely to be kala-azar that the patient should be treated as such by tartar emetic intravenously, which is a specific remedy for tho disease.

THE ABILITY OF BRAIN TISSUE TO TAKE UP WATER IN DELIRIUM TREMENS AND OTHER CONDITIONS.[1]

By F. NUZUM and E. R. LE COUNT.

FOLLOWING the enforcement of the Harrison Narcotic Law, many drug users turned to alcohol as a substitute. A notable increase in the number of patients suffering with delirium tremens has been the result, and the availability of a number of bodies for *post-mortem* examination has prompted this study.

(1) The brains of twenty persons dead from delirium tremens, removed from the body on an average twenty hours afterwards and immersed in distilled water for forty-eight hours, show hydration capacities exceeding those observed in any other condition encountered among 130 miscellaneous necropsies, with the exception of three instances of uræmia, one of morphine poisoning, and those of cerebral embolism and hæmorrhage.

(2) The brains of rabbits dead of experimentally produced chronic alcoholism (daily intoxicating doses of alcohol by stomach for from two to four months) were not grossly œdematous, but possessed a *post-mortem* hydration capacity even greater than that of human brains, and 8 per cent. in excess of normal rabbit brains.

(3) These indications of an alteration of the hydration capacity of the brain colloids may be assumed to be the result of tissue asphyxia and the resultant accumulation of acids secondary to the action of the narcotic alcohol.

(4) Such an interpretation is in some measure supported by the very high hydration capacity observed with uræmia in which clinically an acidosis is known to exist.

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[1] Abstracted from the *Amer. Med. Journ.*, December 16, 1916

Original Communication.

PROPHYLAXIS IN BILHARZIASIS.

By F. G. Cawston, M.B., B.C.Cantab.

The economic importance of bilharziasis in South Africa may be judged by the profound influence it would appear to exert upon the mental and physical development of school children in infected areas. In the report of the Medical Inspector of Schools for the Transvaal for last year (1915), Dr. Leipoldt says: "So much have I been struck by the possibility of bilharziasis as a factor in retarding the child's progress at school that, were it possible to do so, I would now, as a matter of routine, examine the urine in every case of suspected mental backwardness, of malnutrition, or of anæmia. . . . It must be clear to anyone who notes the serious complications that arise in some cases, and the general constitutional impairment which is a feature of nearly all cases, that the disease is of national importance."

The report goes on to point out that bilharziasis exists in all districts of the Transvaal, but is more common in the Waterberg, Middelburg and Pretoria districts. In two Pretoria schools the combined percentage of bilharziatics amongst the boys was 31·2 per cent.; but only boys presenting symptoms of the disease were examined. At the Middelburg Public School the percentage of infected boys was 29·8 per cent.; but careful examination of a number of apparently healthy boys showed that a further 50 per cent. harboured the parasites. In the Rustenburg School, where *Physopsis africana* abounds in the river where boys bathe, some 76 per cent. of the boys were found to be bilharzia carriers.

Dr. L. J. J. Orpen, Additional Health Officer for Southern Rhodesia, in his reports for 1916, states: "The following show heavy infection (about 50 per cent.): Umtali, Darwin, Marandellas, Sinoia, Mtokos and Mazoe." He reports an average infection of bilharzia at Salisbury and Mrewas, and a low infection at Hartly, Rusape and Charter. Generally speaking, the northern districts nearest alien territory seemed to be most infected, and large numbers of infected northern and Portuguese natives enter the territory every year, thus adding to the existing infections.

The means that have been adopted in South Africa to prevent the spread of bilharziasis have consisted in filtering the water supply of towns and forbidding bathing in infected pools. These measures have proved most effective, and have resulted in an almost complete disappearance of fresh cases of the disease at Durban and Kingwilliamstown. Were they adopted in all infected areas and filtered water provided for bathers, little more would be required. Lieut.-Colonel Leiper has expressed the same opinion in regard to the prevention of bilharziasis in Egypt. He says: "It is obvious that in large towns, where filtered water is supplied both for drinking and bathing, there is practically no risk to the European." The somewhat complicated investigations which were made by the Bilharzia Mission to Egypt, 1915, were made because the water supply of Cairo was partly an unfiltered supply. In South Africa there is no need to make use of water that is already infected; in Cairo this seems to be unavoidable. Here, baths containing filtered water, or water that has been recently strained, can be provided for white boys, or rain-water shower-baths can be provided for schoolboys. Here, it is the white boys more than the natives that are attacked, and the disease is uncommon amongst the Indians. Here, it is quite within reason to prevent persons from bathing in infected places or from infecting the water with urine and fæces; this would seem to be impossible when dealing with the natives of Egypt. Here, water can be kept in the reservoir for at least two days before being supplied to a town, in contrast to the canals which pass right through Egyptian villages. The steps that could be adopted to eradicate the disease from the Union of South Africa are far less complicated than those that are required in Lower Egypt, where bilharziasis is so prevalent that it causes a heavy annual mortality.

Prophylactic measures include:—

(1) *The Sterilization of Evacuations of Infected Persons.*—As some 50 per cent. of cases show few symptoms and miracidia are found to hatch out of ova from the urine of cases which have been apparently cured for several years, antiseptics should be freely employed in the urinals and lavatories of infected schools.

(2) *Explanatory Pamphlets.*—The disease is most common amongst small boys who are *learning* to swim, and parents should be informed of the dangers of this intractable disease, where a person remains infectious to the community for twenty or thirty years after the disease has been contracted. Some months ago I forwarded to General Smuts a pamphlet of this kind, suggesting that it might be reprinted for distribution among the troops in East Africa. He acknowledged it with thanks, and said he would lay the matter before his medical staff.

(3) *Filtering the Water Supply.*—This is a sufficient safeguard, provided the water takes at least two days before it reaches the dwelling houses. Another perfectly effective remedy, provided there is no bathing above the reservoir and fresh-water snails do not abound at the source of the river, is *straining* the water through copper ribbons, which preclude the entrance of possibly infected snails. It is not necessary to prevent the entrance into the reservoir of cercariæ, because their life is so short. At Pietermaritzburg the water takes eight days from the time it is strained until it reaches the town. The Durban water supply is derived from Umlaas, where the water is filtered through sand. As the survival time of cercariæ is so short, any lethal drugs are unnecessary.

(4) *Bathing* in salt-water baths, or where the water is filtered or strained, should be encouraged, and bathers should be discouraged from swimming in rivers or infected pools. Bathing should be

forbidden in any pool or river where specimens of *P. africana* are found on the decomposing reeds. Pools that are known to be infected should be filled up and, as far as possible, reeds should be removed from bathing-places. Bathing-pools where *P. africana* is not found are probably perfectly safe for bathing. April, May and June would seem to be the most dangerous time of the year to become infected; but, as a snail takes only about three weeks to become infected and produce bilharzia cercariæ, any bather where physopsis exists is liable to infection at any time of the year.

(5) A certain number of snails could be destroyed in muddy pools by *salting* the ground or by the use of *ammonium sulphate*, but they would die just as quickly if the pools became dry.

In South Africa the town supply of water is in almost every instance free from cercariæ, and any infection that takes place comes from bathing in infected pools.

Repeated experiments to produce infection by the mouth in South Africa have always failed, the only recorded infection that took place in this way (see *Journal of the Royal Army Medical Corps*, 1915) being through the mucous membrane of the mouth where *Cercariæ mansoni* were probably used. Cercariæ perish in small quantities of hydrochloric acid, such as exist in the stomach, and where infection does take place it almost undoubtedly does so by way of the skin.

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DEATHS FROM WILD ANIMALS IN INDIA.

It is not generally realized how large a number of deaths is caused annually in India by wild animals. Reports from Simla on November 30 state that during the year ended June 30, 1916, 26,385 persons died in India from snake bite, an increase of 3,700 over the previous year. Over 2,000 more deaths were caused by elephants, tigers, and other animals.

During the past five years elephants, tigers, and other animals have killed 9,192 people in British India, and, of these, tigers have claimed a total of 3,682. In the same period 116,828 persons have died as the result of snake bites.

Last year the highest total of deaths due to animals in any one province was in Bihar and Orissa, where 684 people lost their lives, tigers alone accounting for 376. In the United Provinces one man-eating tiger in the Almora district killed ten persons out of the provincial total of twenty.

In order to effect the destruction of as many wild animals and snakes as possible, the Government pays bounties. The number of animals destroyed in 1915 was 25,036, including 1,582 tigers, 6,623 leopards, 2,775 bears, and 2,191 wolves. The total number of snakes killed was 184,663.

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Tropical Medicine and Hygiene

MARCH 1, 1917.

THE DISAPPEARANCE OF SOME FORMIDABLE MALADIES DURING RECENT YEARS IN BRITAIN.

Every epidemic disease disappears for a time, but until recent yesterdays the disappearance was but temporary. They recurred with their inherent virulence, at intervals, annually, triennally, or at longer intervals with more or less regularity up to as much as 300 years, as in the case of plague.

The eradication, however, of a disease ought to be, and is, the aim and object of modern medicine and of sanitary endeavour, and we can congratulate ourselves that this has been accomplished with a measure of marked success.

In Britain *Leprosy* may be said to be an example of eradication, and perhaps the first of endemic ailments to be scotched, then checked, and finally eliminated as a national scourge. How this was accomplished it is difficult to state; whether segregation was the sole cause would seem doubtful, for experience is somewhat against raising this means of dealing with leprosy to being regarded as the positive eliminating factor. The next to be mentioned is assuredly *Small-pox*. In pre-Jennerian days the prevalence, the virulence, and the death roll of this disease is beyond the conception of British folk of to-day, except amongst those who have seen a small-pox epidemic amongst an unprotected people. The British doctor who takes up work in, say, the interior of China to-day can testify to the misery small-pox causes, and the toll of disfigurement and lives it exacts. But a hundred years ago in Britain so widespread was the disease, so fatal in its effects, and so disfiguring to those whose lives it spared, that every woman not pitted with small-pox was pronounced "fair." The origin of the phrase "fair women" arose, not because the women were necessarily beautiful or that they had fair hair or blue eyes, &c., but from the fact that they were not marked by small-pox; a testimony, for all time, of the prevalence, before vaccination was insisted upon, of this scourge of scourges. The disease has practically disappeared, for it only occasionally breaks out in consequence of laxity of vaccination in consequence of "opinions" amongst a small minority of people endowed with the faulty intelligence which accompanies reversions of type to a lower state of being.

The disappearance of these two ailments, leprosy and small-pox, in our national life are no doubt looked upon as rather prehistoric by many, and it is well to discuss, therefore, other diseases which have disappeared within the lifetime of persons of even middle age.

Typhus may be selected as perhaps the oldest of modern disappearances. Modern hygiene dates only from the Crimean War, 1854-55. It was on the experiences gained during that campaign that Parkes gathered his knowledge and formulated the principles of sanitation which have expanded as time advanced, until to-day they constitute a very Bible of Health for all mankind. The practical application of these principles began in London in 1866, when the great campaign against overcrowding was launched, and became gradually disseminated, until to-day they constitute the very essence of the fight against a scourge which served to keep the population of these islands at a minimum. By their introduction the establishment of factories became possible, the essential item of which is the congregating of large numbers of the working classes in towns under conditions which implied overcrowding and surface crowding with all their determinental sequelæ. So pronounced is the disappearance of typhus that in London to-day no case of this disease exists, and of late years sporadic cases only have been reported, and it may well be the fact that even these were cases of mistaken diagnosis.

Typhoid, which in earlier days was classed along with typhus and pronounced to be an abdominal form of typhus, and is still on the continent of Europe styled in many instances "typhus abdominale," is, so far at any rate as London is concerned, if not an extinct, one of the rarest of diseases. In our London hospitals it is regarded more or less as a curiosity, and any cases met with are mostly importations from the provinces or from abroad. The writer sent a case into a large general hospital in London some two years ago. Not only had the students not seen a case, but students came from other hospitals to see a disease which they had only read of.

One selects London as the town in which to represent the disappearance of typhus and typhoid, for with its immense population one would imagine they would be more prevalent there than elsewhere. This is not so, for in other towns in Britain and in rural districts both occur from time to time, infrequently it is true, but still to a sufficient extent to justify alertness on the part of both the medical practitioner and medical officer of health.

Hydrophobia, since the dogs were muzzled by order of the then Home Secretary, Mr. Walter Long, has disappeared in the British Isles. Dogs, moreover, no longer are afflicted with rabies; nor are other animals, such as cats, foxes, weasels, ferrets, badgers, and even rats capable by their bites or scratches of causing hydrophobia in man. The muzzling of the dog not only freed the canine species of rabies, but also all the other groups of animals mentioned above: A truly marvellous hygienic feat unparalleled in its completeness and the suddenness of its efficacy.

Cholera of the Asiatic type has not visited London since 1866, although previous to that date periodical visits were to be looked for.

Plague has been kept under control; not but that we have had several outbreaks in Britain during the past fifteen years, but in no case has the disease gained ground, nor spread from one town to another, nor to the country around.

Constant vigilance has thwarted the spread of plague, and it is only by the constancy of the vigilance exercised by vaccination and attention to sanitation that the ailments mentioned have been kept under. The germs of the disease are ever around us, ready to become dangerous the moment neglect or slackness of hygienic rules and regulations occurs, and it is only by perpetual and close watchfulness that the freedom from these diseases is obtained or obtainable.

No mention is made above of the extinction of malaria in Britain—a fact nevertheless. No part of Europe was more severely subject to malaria than the south-eastern and eastern districts of England. The valley of the Thames, especially along its lower reaches, was a hotbed of malaria; the evils of "night air"—in other words, the danger of opening the windows at night, whereby the "bad air" was admitted was nowhere more rigidly acted upon. No one with any regard for health goes to sleep nowadays without the window being open and the night air is welcomed; this has come about because England has been drained; the swamps where mosquitoes bred have been abolished, and Britain has been for ever freed from one of the most prevalent of its ailments, and one calculated to cause physical deterioration of the community.

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We deeply regret we have to announce the death of Captain Frank W. H. Simpson of the Royal Garrison Artillery, attached to the Royal Flying Corps, and who was killed in action in France on February 16. He was the only son of Professor and Mrs. W. J. Simpson, of 31, York Terrace, Regent's Park, and was 25 years of age. Educated at Winton House, Winchester, Cheltenham College, and the Royal Military Academy, Woolwich, he obtained his commission in the Royal Artillery in 1910. Before the War he had passed the Army examination in Russian. In Malta when the War broke out, he came to England with his battery, and proceeded later to France. Eighteen months ago he joined the R.F.C. as an observer, and was mentioned in dispatches; later he became a pilot, and ultimately the senior flight commander to the squadron. Endowed with an exceptional combination of talents, artistic and scientific, he was not only a brilliant young soldier devoted to his profession and a good organizer, but he was a splendid draughtsman and caricaturist, and possessed an inventive faculty which, had he lived, was bound to be of great service. In 1912 he invented for the Admiralty an automatic water-tight ventilator suitable for the ventilation of warships in rough weather, and he had just invented an improved method of communication between infantry attacking and the aeroplanes that have to keep in touch with them. The General commanding the Flying Corps had expressed his warm thanks for what he termed this highly ingenious device. His O.C. writes that "he always set a splendid example to others by his courage and hard work." He leaves a young widow to mourn his loss.

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Emollient Lotion.

Tragacanth	...	...	gr. iii.
Glycerine	...	...	ʒjss
Acid boric.	...	...	gr. x
Water to 1 oz.			

Abstracts.

UNUSUAL CASE OF UMBILICAL HERNIA.[1]

By John W. Lane.

The past history was negative, save for the fact that the patient had suffered for several years from a small incarcerated umbilical hernia.

The present illness began June 24, and was ushered in by a severe pain in the mass at the umbilicus. This pain persisted until June 26, when it suddenly ceased. During this time the patient vomited nearly twenty times, but whether the vomiting was fæcal was not known. On the evening of the 25th the vomiting ceased, and there were several evacuations of the bowels following a dose of citrate of magnesia. On June 26 a redness and tenderness appeared about the umbilicus, and the hernial mass disappeared. On June 27 the area of redness had extended, and was very much more tender.

The physical examination showed a well-developed and rather stout woman about 52 years of age. The examination was generally negative except for the abdomen. The abdomen was somewhat obese and was not distended, but lax and tympanitic. There was no protrusion at the umbilicus, but the depression thereof was unusually large and surrounded by an area of redness and tenderness and induration about 6 in. in diameter.

The patient entered hospital on the evening of June 27, and was operated on the following morning morning under ether. As the greatest redness was below the umbilicus, a vertical incision about 3 in. long was made below the umbilicus, and at a depth of $1\frac{1}{2}$ in. in the fat about 2 oz. of foul-smelling pus was evacuated. The pus had an odour characteristic of an appendix abscess. After the excess pus had been wiped out, there appeared in the upper end of the wound a red mass about the size of a lemon.

On enlarging the wound this appeared to be the sac of a hernia with a rent about $\frac{1}{2}$ in. in diameter. In the left lower border protruding from this rent was a sharp, hard, foreign body. The rent in the sac was slightly enlarged upward, and a finger being introduced cautiously, came in contact with a loop of small intestine. The foreign body was seized in a hæmostat, and withdrawn and found to be a piece of animal bone, $1\frac{7}{8}$ in. long and $\frac{3}{8}$ in. wide. Further inspection revealed a piece of small intestine strangulated in the sac, reddened but not gangrenous, and showing a perforation of $\frac{1}{4}$ in. in diameter, with its mucous membrane everted. The perforation in the gut was closed with interrupted plain catgut sutures in two layers. In the presence of so much infection it was not deemed advisable or safe to attempt a radical cure of the hernia, but the abdominal ring was enlarged slightly to relieve the strangulation, and no effort was made to return the bowel into the abdominal cavity. Cigarette drains were placed around the sac and a large dressing applied.

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[1] Abstracted from the *Boston Medical and Surgical Journal*, January 11, 1917.

The patient made an uneventful convalescence save for a slight fæcal discharge which entirely ceased by July 9. On July 12 the patient was discharged from the hospital, the wound being clean and granulating, and at the upper angle showing the mass of the sac almost on the level with the skin. On July 19 the patient's husband reported that the wound was almost healed and that she was out of doors taking a little exercise.

A few weeks ago she was perfectly well.

This case is unique almost, in that there was a perforation of a strangulated hernia by a foreign body. This foreign body was probably a piece of animal bone. The patient had no recollection of swallowing any foreign body or of having any difficulty in swallowing at any time, yet it would seem almost impossible for her to swallow a piece of bone of such size without much trouble.

Another remarkable feature of the case was that the bowel practically disappeared within the abdominal cavity, and, in spite of the presence of so much pus, produced no general peritonitis.

THE TREATMENT OF MALARIA AND MALARIAL COMA BY INTRAVENOUS INJECTION OF QUININE URETHANE.[1]

By Lieutenant Richet and Walter B. Griffin.

The cases of malaria treated were of a severe type; in all anæmia, loss of weight, and exhaustion were marked; there were rigors in which the temperature reached 107·8° F. Most had received numerous intramuscular injections of quinine, some as many as ten or twelve, and all had been treated with quinine by the mouth. In the severe cases quinine by the mouth and intramuscularly had little effect in controlling the fever or the recurrence of rigors.

The type of case in which the patient passed into a state of coma in twenty-four hours was new to most of us. The men were usually markedly anæmic and wasted, but the temperature rarely exceeded 102° F. Quite suddenly the patient would complain of difficulty in swallowing, rapidly followed by inability to speak, loss of power in the limbs, coma, and incontinence of urine and fæces. The pupils were dilated, reacting sluggishly to light, pulse feeble and quick, and respiration resembled the Cheyne-Stokes characteristic. The spleen was enlarged and tender, knee-jerks diminished, Babinski's sign was absent, and there was no ankle clonus. Examination of the blood showed the presence of numerous gametes and schizonts.

These symptoms all came on within twenty-four hours, and it was for this type of case that intravenous injection of quinine urethrane was first tried.

The injection was made with a fine needle mounted on an ordinary serum syringe of 15 c.c. capacity, and the solution was made up as follows:—

Chlorhydrate of quinine	0·40 c.c.
Urethane	0·20 c.c.
Distilled water	1 c.c.

To this solution in the syringe was added 14 c.c. of physiological serum well warmed. The skin was sterilized with tincture of iodine and alcohol, and a bandage applied above the elbow to render the veins more prominent. When the needle enters the vein blood will flow back into the syringe, and this sign will prevent the solution being injected into the tissues. Remove the bandage and inject the solution very slowly; conscious patients noticed a bitter taste in the mouth, buzzing in the ears, and slight giddiness within a minute.

The results in cases of coma were remarkable. In five hours the patient became more couscious, and in periods varying from twelve to twenty-four hours he had recovered completely and all symptoms had disappeared.

For some cases one injection was sufficient, and for weeks after there was no further rise of temperature; other cases were given a second injection within twelve hours if the return to consciousness appeared slow.

In no case had the injection any ill-effect; only one patient in a series of seventy cases had slight thrombosis of a vein for a few days. Within twelve hours of the injection Lieutenant Richet found evidence of disintegration in the gametes and schizonts, and it was difficult to find any after forty-eight hours.

Two cases of coma only proved fatal, both complicated by dysentery. Each case had two attacks of coma, recovering from the first after intravenous treatment, but relapsing three days later into a second, from which no effort could restore them. Intravenous injections of serum and adrenalin, oxygen by the mouth and subcutaneously, proved of no avail. All cases had been treated with quinine by the mouth and intramuscularly over long periods, and we continued to give them 15 gr. daily by the mouth after intravenous injections. An attempt was made to treat all cases of malaria with continued high temperature and constant rigors with intravenous injections of quinine urethane, and the results were more than satisfactory. Practically every case yielded to this treatment, and the rapid improvement in the physical condition of the men was most marked.

Sometimes it was necessary to give two or three injections before the temperature remained normal and the gametes disappeared from the blood, and every endeavour was made to give the injection six hours before the rigor was expected, according to the type of malaria from which the patient suffered. We never found it necessary to give more than 6 to 10 gr. in one injection.

Several cases of pleurisy with effusion, but without any fever, occurred in malarial patients, and the fluid rapidly absorbed after intravenous injections. For the anæmia arsenic was given by the mouth or sodium cacodylate injected hypodermically.

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[1] Abstracted from *Brit. Med. Journ.*, February 10, 1917.

Many men arrived at the hospital with the chronic form of malaria which had well-marked symptoms. Chronic headache, often diarrhœa and sickness, anæmia, lassitude, with an evening rise of temperature to 100° F., occurred in nearly all these patients, and the symptoms rapidly yielded to intravenous treatment.

The conclusion arrived at was that intravenous injection of quinine urethane was the only treatment of malarial coma and a valuable remedy for persistent and chronic forms of malaria; it was also painless.

Intramuscular injection of quinine was painful, and often cases arrived with indurated lumps in the buttocks from the effect of injection which later broke down into abscesses.

BLASTOMYCOSIS OF THE TONGUE.[1]

By G. B. New.

J. S. M., man, aged 52, chief of fire department, came to the Mayo Clinic, February 7, 1916, for tumour of the tongue which had been first noticed eleven months previously. Sixteen months before examination at the clinic he had had tonsillitis and was treated by a physician. Eleven months before he had received an electric shock from touching an electric fixture with his right hand. On the following morning he noticed that his tongue was larger than usual. The next day he consulted a physician, who found a tumour at the base of the tongue and removed specimens for diagnosis. These specimens were reported as being "mostly lymphatic gland containing much granulation tissue; no evidence of malignancy or tuberculosis." Electric treatments for the tongue were given at this time. Nine months before coming to the clinic he was given five treatments with neo-salvarsan and eleven injections of sodium cacodylate, with no resulting change in the tumour. At this time he had much difficulty in swallowing and talking. A month later he consulted a physician, who diagnosed the condition as lymphadenoma, and cauterized the tumour several times with an electric needle. This was done once a week over a period of two months. There had been shortness of breath for eight months, and also great difficulty in swallowing solids, though fluids were swallowed readily. The tumour seemed to be increasing in size, but no swellings in the neck were noted. The patient had lost 60 lb. since the onset of the trouble, and found it almost impossible to sleep at night as the tongue fell back and obstructed the pharynx, causing dyspnœa. The normal weight had been 220 lb.; weight at the time of examination, 150 lb. Speech was difficult; the voice was thick and mostly nasal in character.

Examination of the mouth showed a nodular tumour at the base of the tongue, filling the entire pharynx so that the post-pharyngeal wall was not visible. It was impossible to press down the tongue in order to examine the posterior part of the growth. The tumour was quite firm, but did not have the hardness of malignancy. It appeared in rounded folds between which were greyish-white areas. There were no lesions in other parts of the mouth. The tissue removed from the tumour showed microscopically lymphoid hyperplasia with great numbers of plasma cells. Blastomycetes were found on culture from the areas in the folds of the tumour. A culture of blastomycetes injected into guinea-pigs yielded negative results.

A diagnosis of blastomycosis was made on the presence of blastomycetes with secondary lymphoid hyperplasia of the tissue of the tongue, and because all other findings were negative. Malignancy, tuberculosis and syphilis can be readily ruled out from the data stated in the history and the appearance of the tumour. The patient was given potassium iodide, 10 drops (1 drop = 1 gr.) three times a day, the dose being increased by 2 drops daily until 125 drops were taken three times daily. Iodine was used locally to swab the tumour once a day, and radium, twenty-six hours of a 22 mg. tube, was given for a period of three weeks. Five weeks after this treatment the patient returned showing marked improvement in his general health. He was then able to eat and swallow without difficulty, had no dyspnœa on exertion, and had gained 20 lb. in weight. The tongue showed remarkable improvement, and in a direct examination of the mouth very little of the tumour was visible. It was possible to see the pharynx, and by the use of the laryngeal mirror it was found that the tumour extended down the base of the tongue to the epiglottis. Sixteen hours of a 50 mg. tube of radium were then given for a period of two weeks, the iodine again applied locally, and the potassium iodide continued. Four weeks later the patient returned feeling perfectly well, eating and sleeping without any trouble. He had gained 15 lb. since his last visit. The tongue appeared normal on direct view, and it was possible to see the pharynx readily. By the use of a laryngeal mirror a nodular tumour $1\frac{1}{2}$ in. in diameter was seen down at the base of the tongue. About it were several small nodular tumours. The larger one was removed by a snare and forceps. On microscopic examination it showed pure lymphoid hyperplasia. The smaller nodules were treated with radium, sixteen hours of a 22 mg. tube. Iodine was applied locally and the potassium iodide continued. When examined, August 10, 1916, the tongue was normal. The patient had gained 16 lb. since his last visit, and was feeling well.

It must be remembered that blastomycetes may be found in the tonsils and lingual tonsil, so that the presence of blastomycetes alone does not necessarily mean that the disease is true blastomycosis. It would seem the lymphoid hyperplasia was a secondary condition stimulated to growth by the presence of blastomycetes, possibly in the lingual tonsil.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, January 20, 1917.

THE VOMITING SICKNESS OF JAMAICA.[1]

By H. Harold Scott, M.D , M.R.C.P.Lond., D.P.H.
Government Bacteriologist, &c.

The vomiting sickness of Jamaica has existed in that island for many years, particularly prevalent n the cooler months, November to March or April, and in each year it has been responsible for a considerable number of deaths, and in some years has exacted a terrible toll among children.

After referring to many abortive investigations to settle the etiology of the disease, Dr. Scott states that on the occurrence of an outbreak in February, 1915, he had the opportunity of investigating the outbreak, and came to a definite conclusion concerning the cause of the disease.

The Symptoms of Vomiting Sickness.

The patient—almost invariably a child—in apparently perfect health, suddenly complains of feeling ill, and occasionally of pain in the stomach. This is usually mere discomfort and not, I believe, actual pain, but, as the native tersely puts it, ' him belly trouble him, doctor.'' He then vomits; perhaps only once, perhaps three or four times at short intervals. Recovery then seems to take place, and, if the attack occurs at night, the child drops off to sleep, apparently well again. Some three or four hours later (occasionally after a longer interval) the child wakes up, again complains of feeling sick, and begins once more to vomit, usually frothy mucus, and later watery fluid only, or it may be bile-stained. There is little if any accompanying effort, unless the stomach be empty, when troublesome retching may ensue. Within a very short time, often a matter of a few minutes only, convulsions make their appearance, coma rapidly supervenes, and terminates in death.

Recovery from the first attack of vomiting being to all appearances complete, a doctor is not usually summoned until the relapse occurs. The majority of patients, therefore, first come under observation during the convulsive or comatose stage. The temperature is usually normal or sub-normal, rarely 100° or 101° F.; the pulse is of good volume, and rate is 90 to 100 per minute; respiration 26 to 30, and regular until towards the end, when the Cheyne-Stokes rhythm may be noticed. The pupils are equal, moderately dilated, and, if the coma is not too deep, react to light. There is no delirium, and, shortly before passing into the comatose stage, the child may remark that it feels very bad, but does not call attention to any particular symptom or complain of any localized pain. There is no rigidity in the true vomiting sickness cases (except, of course, during a convulsion), but a general limpness of muscles; movement, such as turning the patient over for examination purposes, or to obtain fluid by lumbar puncture, frequently leads to a repetition of the vomiting.

Vomiting.—This may be, and usually is, the first objective symptom. The nature of the material vomited is usually at first food, or if a considerable interval has elapsed since the last meal (and this is uncommon), frothy mucus, then watery matter, later bile-stained. At times the vomiting may be replaced by troublesome retching. Next, as regards the times at which vomiting occurs. In a typical case, as you have already heard, vomiting takes place at the onset, and may be the very first symptom. It is usually accompanied by considerable effort, and is repeated two or three times at short intervals. This I have termed "initial vomiting,'' and gives one distinctly the idea of an effort on the part of the stomach to rid itself of some noxious material.

After an interval of calm, during which there are practically no symptoms, there is a return of the vomiting, and now it is of a different character. It is, to a great extent, effortless, and may be unaccompanied, by nausea. This I have designated "secondary vomiting,'' and it is, in my opinion, cerebral in origin, owing to its character of being effortless and induced by movement, and to its being followed almost at once by other nervous symptoms, twitchings, convulsions, and coma.

Initial or secondary vomiting may be absent. Thus, as stated already, the former only is seen in cases which recover—in other words, the patients never reach the stage when the secondary cerebral symptoms appear. On the other hand, this "initial vomiting" may be suppressed in the very rapid and acute cases. There is an attack of vomiting which is so rapidly followed as to be almost accompanied by the convulsions and coma, the entire symptoms being cerebral, owing, as I interpret it, to rapid absorption of the toxin from an empty stomach. Death in these cases may occur in an hour, or even less.

More rarely, the secondary attack of vomiting is suppressed; the patient may pass through the initial attack and appear to improve; then, after a considerable but varying interval, he is seized with convulsions, passes into the comatose stage, and dies.

Lastly, vomiting may be absent, and the cerebral symptoms may be the first indications of anything wrong. For example, I have among my notes the following case: A child, aged 4, was quite well when she ate her dinner at 1 p.m. Two hours later (note the interval, please), she felt out of sorts and went to lie down. An hour or so afterwards her mother went to waken her, but could only partially do so; twitching of limbs and slight convulsions came on, and the child lost consciousness altogether and remained comatose till death.

Such cases have been diagnosed somewhat paradoxically as "vomiting sickness without vomiting,'' and I am sure that they do occur, though with exceeding rarity. Such a diagnosis, however, could not be made unless, firstly, true vomiting sickness cases were occurring at the time; secondly, all other causes could be excluded; or thirdly, the post-mortem signs, especially the microscopical, were those of vomiting sickness.

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[1] *Transactions of the Society of Tropical Medicine and Hygiene*, January, 1917, vol. x, No. 3.

Convulsions.—These may vary from merely slight twitching movements of the limbs to definite massive convulsions. They may be tonic muscular contractions lasting for a few seconds only, or more clonic and epileptoid in character. Looking over my notes in cases which recovered, slight twitching movements occurred in one patient only, a child, aged 4. We have all of us seen slight twitching movements in a child asleep, in ordinary health, or possibly with a little dyspeptic disorder. With reference to the vomiting sickness one may safely say that in no cases which recover are convulsions seen.

Coma.—In most of the cases which I have seen this has been deep; as a rule, there was absolute unconsciousness with absent conjunctival reflex. In some, at an earlier stage of the coma, there was general flexion, and some irritability was exhibited when attempts were made to rouse the patient; but this "cerebral irritation stage" was transitory and soon passed into one of deep coma.

Age.—The condition is, to a great extent, one of childhood; sucklings are not attacked. I have records of only two cases under the age of twelve months, and these were not breast-fed. Nearly half the cases (44·84 per cent. of my series) occur in the first quinquennium, another 30 per cent. in the second, and 85 per cent. of cases are under the age of 15 years. The mortality rate is high in all these periods; thus, of those under 5 years, 85·06 per cent. died; of those between 5 and 10 years, 86·21 per cent. died; and 84·24 per cent. of those attacked under 15 years succumbed.

Duration of Illness.—In 140 instances I have been able to obtain reliable accounts of the duration of illness. The shortest recorded was in a female child of 1 year, death taking place in thirty-five minutes. The average duration of the total number works out at 12·72 hours.

Four cases representing the symptoms of the different types:—

(1) A mild case: a girl, aged 9, was given some "soup" from boiled ackees and bananas at noon. At 2 p.m. she complained of pain in the belly and vomited. This vomiting continued on and off for three hours. She was seen by a medical man, who gave her a mixture containing ether and ammonia. The vomiting ceased, and the child had quite recovered by the following evening.

(2) A male, aged 3, in normal health when he was given an evening meal of the soup made from bananas, yams and ackees. Two hours later, without any complaint of pain, he vomited. He rapidly recovered from this, and appeared quite well on being put to bed an hour or so later, and slept well till just before dawn. He then, without any warning, suddenly vomited again, was shortly afterwards seized with convulsions, and coma supervened, which lasted till death at 11 a.m. The total duration was sixteen hours; there was a symptomless intermission of eight to ten hours, and death occurred in five hours after the onset of the secondary vomiting. Here we have an example of a case apparently quite mild at first, but nevertheless terminating fatally.

(3) A girl of 6 years, after a similar meal, went to bed in her usual good health. Early in the morning, without any warning or previous complaint, she suddenly vomited, and did so three times in the course of an hour. During the day she stayed in the house and did not feel quite well, but took food. She seemed better in the evening, and slept well during the night. Early the following morning, without warning, again she started vomiting, frothy watery material, without any effort. A few minutes later she was attacked by convulsions and passed into a state of coma, dying at 2 p.m. This case resembles the last, but differs in the longer duration of illness, and in the fact that the interval was one of improvement, not total abatement of symptoms.

(4) A girl of 12 years left home in good health for school, three miles away. At midday she had a meal containing ackees, and returned to school, where nothing amiss was noticed, until three hours later she started to vomit; this occurred four times. Feeling better she started for home, but during the walk she felt ill again and vomited at intervals, taking three hours to make the three-mile journey. Shortly after arriving she became drowsy, this drowsiness deepened to coma, and she died about midnight without recovering consciousness. Here we have an example of a case in which convulsions were absent.

PATHOLOGICAL FINDINGS.

Hyperæmia of most of the organs, including the meninges, with œdema of the supporting tissues; there is a tendency to hæmorrhages evidenced by small extravasations, e.g., in kidneys, adrenals, lymph glands, spleen, lung; the epithelium, particularly of the kidney tubules, the pancreas and liver, shows necrobiotic changes; and, lastly, and most important, is a marked fatty change in many organs, notably the liver, kidneys, sometimes in the cells of the pancreas and heart muscle, and the large Betz-cells and others in the brain.

Of course, in a disease such as this, which becomes epidemic every year, bacteria have been suspected and carefully looked for, without result. In fact, two years ago, during the course of my investigations, I stated "in my opinion the disease has no bacteriology. The organisms which have been found in some of the patients (a small percentage only) I can see no reason for regarding as in any way causative."

I investigated thirty-two cases in one district. A few of them may be briefly mentioned in order to make clear to you the sequence of events and the direction which my investigations subsequently took.

(1) A male child, aged 10. At 5 p.m., February 17, complained of pain in the stomach and began to vomit. He vomited at intervals till 1 a.m.,

18th, when convulsions set in, rapidly succeeded by coma, which lasted till death at noon. The patient had been quite well till the first vomiting at 5 p.m. At three o'clock, two hours previously, he had partaken of a meal consisting of yam, ackees, and bananas, all boiled together. The ackees were mostly removed and eaten by the older members of the family, leaving the soup, or "pot-water," as it is called, for this child and the one following, who, in addition to taking some of the soup, was given a little of the solid also.

(2) Female, aged 13; cousin to the last, and living in the same house. Also quite well until about 5 p.m., when she began to vomit, and continued to do so off and on till midnight. In the course of the following morning vomiting again returned, and the patient soon after lapsed into coma, and death took place during the succeeding night. While comatose this child was restless, but did not have any definite convulsions.

(3) The mother of the former and aunt of the later, aged 26. Shared in the same meal, but only ate the solid ingredients (and naturally some absorbed fluid). Vomiting started about the same time (5 p.m.) and continued during the night, but ceased in the early hours of the morning. Later on, feeling better, she took some more of the same articles of food. Vomiting set in again the same evening, and persisted at intervals during the following day. There was no convulsion, no coma, and the patient recovered in twenty-four to thirty-six hours, though she felt weak.

The Ackee Fruit.

The next point was to make inquiries concerning the ackee, the fruit of *Blighia sapida*, which is used to a considerable extent as an article of diet in Jamaica. Amongst the better classes the ackees are gathered carefully, one by one, and only those which are properly opened and appear ripe and sound in every way are taken for food. Unopened ackees are not used by such people, nor any which have not opened naturally on the tree or have been gathered from an uninjured branch; those forced open after falling from the tree unopened are dangerous. Among the poorer people, however, less care is taken, and a boy is sent up the tree to shake down the fruit; ripe and opened and unripe unopened fall together; the former is collected and the latter left. In time some of these may open and be gathered with fresh ripe ackees brought down at the next shaking.

The Montego Bay outbreak showed that sufficient evidence had been presented to warrant the bringing in of a true bill against the ackee.

Experimental Work.

In order to simulate as closely as possible the conditions under which, by this hypothesis, cases of vomiting sickness occur, some ackees were obtained which to all appearances were good except that they were unopened or had been forced open after being gathered. The part used for food was then boiled with water just as was done by the natives in making their soup or "pot-water." The product, practically a watery extract of ackee, was then filtered. The result is a liquid of the colour of weak tea with a layer of oily, fatty matter like melted butter floating on the surface.

This extract was administered by mouth to kittens, a pup, guinea-pigs, rabbits, Belgian hares. The three last-named were unaffected. The other animals exhibited the same train of symptoms, so that the recital of one will suffice for all. Within an hour of administration of a small quantity vomiting set in, and the animal was inclined to be heavy and dull for about half to one hour. Recovery then took place, and the animal became normal and lively again. The following day a slightly larger dose was given with similar results, recovery being apparently complete in two hours or a little more. After an interval of three hours a third dose was given twice the size of the first. Vomiting came on forty-five minutes later, and the animal became dull and drowsy, its head nodding as with sleep in some cases, in others it merely lay about and was disinclined to move, and vomited at intervals. This drowsiness gradually deepened to coma during the succeeding hour, and death took place some four hours after the last administration. The total amount given was the extract from one ackee. The post-mortem appearances were, both naked eye and microscopically, absolutely typical of those found in human vomiting sickness patients. I have the specimens for you this afternoon.

Certain peculiarities and characteristics of the affection, which at the onset were most puzzling, find a ready explanation in the light of our present knowledge of the similarity (may one say identity?) between vomiting sickness on the one hand, and the effects and results of experimental administration of ackee extract on the other, linked together by the clinical case of definite ackee poisoning just related. These were:—

(1) *The Peculiar Seasonal Prevalence.*—The epidemic character of the disease corresponds exactly with the main ackee season, when other fruits and natural foods are relatively scarce.

(2) *Limitation to Jamaica.*—I made inquiries of inhabitants of other islands, and was told that the *Blighia sapida* does not grow to any extent in any of them. It is true that one or two trees are found, for example, in St. Lucia, and, I think, Barbados, but they are looked upon as curiosities and are not used for food.

(3) *Sudden onset of symptoms* in the midst of apparent good health, without any incubation period or prodromata, and in the well-nourished and not necessarily the emaciated or debilitated.

(4) *The Rapid and Complete Recovery of Non-fatal Cases.*—This is obvious, and explained by the fact that an acute vegetable poison is taken; if the dose is small it is got rid of by the vomiting, and the patient recovers.

(5) *Affection of several persons practically simul-*

taneously in one house or close neighbours in a settlement.

(6) *The Vastly Greater Preponderance in Children.*—This is explained by the fact that they are given the "pot water," the most toxic part—an extracted poison, in short—and that the lethal dose of a poison is far smaller for a child than for an adult; and also the adults know the risks of eating unopened ackees while children naturally do not.

(7) *Attacking the West Indian Native in much Greater Numbers than the East Indian or the White Man.*—In Jamaica the coolies live largely on rice and split peas, often in the form of curry; they also like green fruit—mangoes, guaves, jack-fruit. They rarely indeed eat ackees. A few, after they have served their time and settled in Jamaica, may eat them, but not at all commonly. The white buys his ackees in the market, where he can see and select them; while, safer still, many will only eat ackees which have been carefully gathered under their own superintendence and from their own trees.

To sum up:—

(1) The term "vomiting sickness" has been used in Jamaica for many years as a comprehensive name for various diseases, including cerebro-spinal meningitis, gastritis, gastro-enteritis, worms, malaria; in fact, any disease occurring in the cooler months and associated with vomiting and convulsions.

(2) During the last ten years the idea has been gaining ground that there is an affection included under the term "vomiting sickness," whose course of symptoms and post-mortem changes are not those of any known disease.

(3) The death-rate from this affection is exceedingly high, 80 to 90 per cent., and a fatal termination takes place in a few hours.

(4) Investigations into a typical and severe outbreak in February, 1915, revealed the fact that, in a majority of the cases in which a reliable history was obtainable, ackees formed part of the last meal taken in health, and that this article of food could not be excluded in a single case.

(5) Persons drinking the soup or "pot-water" made with ackees in certain conditions showed the most acute symptoms; the onset occurred in about two hours, and death nearly always resulted.

(6) The fruit is poisonous if picked from a decayed, bruised, or broken branch; if forced open and not opened naturally on the tree, amongst other conditions.

(7) Most of the poison is extracted by boiling with water.

(8) The symptoms of a case of typical vomiting sickness are: Initial vomiting (gastric in origin) coming on in apparently perfect health; a period of improvement lasting a few hours, succeeded by secondary vomiting (cerebral), rapidly followed by convulsions, coma and death. The average total duration of illness is twelve and a half hours. Initial or secondary vomiting or convulsions may be absent, but not in a large percentage.

(9) Recovery, in my experience, has never occurred when once convulsions have set in, or coma if convulsions are absent; and as a corollary to this, in no cases which recover are convulsions seen.

(10) The affection is largely one of childhood, and shows no predilection for sex.

(11) A reasonable interpretation of the symptoms is: Some poison is taken, or some substance which acts as a poison after it enters the stomach. If the initial vomiting is able to get rid of this substance no further symptoms occur, and recovery is rapid. If this is not the case, there is an interval, a more or less quiescent period of absorption, after which there follow symptoms due to the action of the poison on the higher centres—secondary (cerebral) vomiting, convulsions, drowsiness, coma and death.

(12) In rare instances the cerebral symptoms are those first noticed—convulsions, drowsiness, coma; there is no preceding vomiting—the so-called "vomiting sickness without vomiting."

(13) Intragastric administration of an extract made by boiling unopened ackees with water produced in certain laboratory animals (kitten, dog) the symptoms and pathological changes seen in cases of vomiting sickness.

(14) A case of ackee poisoning in a human subject exhibited the same symptoms, course, and post-mortem changes, macroscopical and microscopical, as (a) human vomiting sickness cases, and (b) animals to whom an aqueous extract of unopened ackees had been administered.

(15) The characteristics of vomiting sickness, the seasonal prevalence, the sudden onset in health, the rapid and complete recovery of non-fatal cases, the rarity of occurrence in white children and East Indians, the pathological changes set up, and so on, all find explanation in the view that the condition is an acute intoxication by the unwholesome ackees—the fruit of *Blighia sapida*.

AMŒBIC DYSENTERY AND THE PROTOZOOLOGICAL INVESTIGATION OF CASES AND CARRIERS.[1]

By Mr. Clifford Dobell.

The circumstances under which the author took part in the organization of pathological work in this country in relation to the dysentery patients and convalescents received from the Mediterranean during and after the autumn of 1915 are related. When the influx of invalided men began no organization staffed and equipped for the diagnosis of protozoal infections existed, and the number of persons available competent to make the requisite examinations and to produce records of scientific value was very small in relation to the sudden call for this particular kind of skill and knowledge. Moreover, the bacteriological examination of the fæces, which was not less important, proved more than sufficient to occupy the time of the whole pathological staff of the hospitals concerned. In these circumstances it was determined to make use of the services of well-trained workers in extra-medical departments of biology, and to set them, after a relatively brief training in protozoal work, to supply the need. The War Office agreed to arrange for the concentration of patients suffering from or convalescent after dysentery in a limited number of centres, and it was arranged in certain of these to submit groups as large as possible to complete examination. Though for various reasons the plan did not work at as large a number of centres as was hoped, nevertheless the protozoal records from certain centres dealt with a sufficient number of cases to make it probable that valuable information could be got from them by careful analytical study, and it was for this reason that the reports were placed in the hands of Mr. Clifford Dobell.

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[1] London, H.M. Stationery Office. To be obtained through any bookseller. Price 1s. 6d. net.

His task was difficult, for the material on which he had to work was of unequal value, and the field of investigation itself is comparatively new, so that methods in it are neither so fully standardized, nor the canons of interpretation so much a matter of general agreement as is the case with bacteriology. He has produced an essay which, though many of its conclusions may be superseded, will remain of permanent value as a contribution to the literature of the subject. When the investigations made for it were begun there was an almost complete lack of information as to the significance to be attached to a negative examination—that is, to failure at any one examination to detect the presence of a particular parasite. A purely arbitrary standard of freedom from infection with *Entamœba histolytica* was therefore laid down by the War Office as a practical necessity; it was not found possible in fixing it to take into account the relation in time of the examinations to the period of treatment with emetine, and this was an additional detriment to the scientific value of the material. It must be remembered, however, that the primary object of the examinations was to test the presence of infection and the results of treatment with a view to restoring sick or dangerously infective men to health and safety, and to fit them for duty. Mr. Dobell gives it as his opinion that negative examinations have no value unless made by a person who has had special training and experience, and that even then they are not to be relied upon absolutely. Personal error cannot be excluded from any single negative examination. Still, speaking generally, he finds it safe to assert that the greater the skill of the examiner and the number of negative examinations made in any particular case, the greater is the value of that examination for that case. When the skill of the examiner and the number of examinations are reduced to the minimum the negative examination ceases to have any value as evidence.

To the evidence supposed to incriminate *Giardia* (*Lamblia*) *intestinalis* in connection with some types of intestinal disorder Mr. Dobell does not attach much weight, and whatever their opinion on this point all will admit the special importance of *Entamœba histolytica*. It is his analysis of the observations accumulated with regard to this parasite that gives special value to Mr. Dobell's essay.

Even in the case of specially trained observers the amount of examination possible to be given to each patient was insufficient for the discovery of all cases of infection, and it is practically certain that in many centres the number of carriers of *E. histolytica* discovered has been but a small fraction of the number actually carrying the infection. He considers, however, that an increase of the number of examinations would result in the detection of all but a few of the cases, given the requisite special experience and skill on the part of the examiner. The examination of men who had been in Egypt or Gallipoli and had been invalided for causes other than dysentery without any history of this or other intestinal disorder, led to the rather disquieting discovery that the proportion of carriers of *E. histolytica* among the small number of non-dysenteric patients thus examined was not below that among the men convalescent from dysentery or enteritis.

The conclusion Mr. Dobell reaches is that the proportion of individuals still infected with *E. histolytica* among the convalescents from intestinal disorders reaching this country from the Mediterranean area has been about 18 to 25 per cent. of the whole number. If it be assumed that carriers of this parasite would be found in a proportion of this order throughout the whole body of troops which had been similarly exposed to the infection, it is evident that its eradication is a national problem of great magnitude, as well as of much importance.

The conclusions as to the results of the treatment hitherto applied, namely, by hypodermic injections of emetine, are disappointing. He shows that the criterion of cure—that is to say, of eradication of the infection by treatment—laid down on the basis of the best experience available at the time when the scheme was started was seriously deficient in two directions: in the first place, the number of negative examinations accepted as indicative of permanent freedom from infection was much too small; in the second place, negative examinations made during a period of treatment with emetine were accepted as evidence of cure, whereas it has been established that evidence of infection is usually unobtainable during such a period, even in cases in which infection returns as soon as treatment is suspended. A study of a selected set of cases in which it was possible to repeat the examination sufficiently often after the conclusion of a course of treatment by hypodermic injections of emetine showed that only in a small minority, not more than about one-third, was a permanent cure obtained. As a matter of fact, the proportion of carriers discovered in the convalescent depots among patients discharged from the hospitals as cured did not differ widely from that found among fresh arrivals who had received no treatment in this country.

His analysis of the evidence as to the efficacy of treatment by the double iodide of emetine and bismuth encourages the hope that the method will result in the permanent cure of a large majority of the patients in a relatively short time. An account of the nature and mode of administration of this drug, which is given by the mouth, will be found in the issue of the *British Medical Journal* of November 4, 1916 (p. 613), in a paper by Mr. Dobell, and in a leading article (p. 626). Mr. Dobell's present conclusions on the matter are that this double salt properly administered has successfully cured the majority of carriers of *E. histolytica* hitherto treated by it, but that in acute dysentery, though the results have been very satisfactory, further trials are necessary. He points out that for treatment to be successful the drug must be given in large quantities; not less than 36 to 40 gr. in daily doses of 3 or 4 gr.; less than that amount is seldom efficacious, and more may be necessary in individual cases. He further states that emetine administered in this form has generally been successful, even when previous treatment with hypodermic injections of emetine hydrochloride have failed. The drug may exceptionally succeed in removing an infection with *E. coli*, but neither it nor any known method of treatment seems to have any influence in removing flagellate infections (Lamblia, Trichomonas, Chilomastix).

Notes and News.

V. W. King (*Journ. Exp. Med.*, vol. xxiii, No. 6) has succeeded in establishing experimentally the development of malaria parasites in three species of anopheles in New Orleans. The species are *Anopheles quadrimaculatus*, *A. punctipennis*, and *A. crucians*. Thayer proved this susceptibility as long ago as 1900 to be the case in the first-named, and *A. punctipennis* was shown recently to be also susceptible, and now, for the first time, King has demonstrated the incrimination of *A. crucians* also. King summarizes the results of the examination of individual mosquitoes after feeding on infected blood as follows: *A. quadrimaculatus* with *Plasmodium falciparum* as 33 per cent., and with *P. vivax* as 85 per cent.; *A. punctipennis* with *P. falciparum* as 33 per cent, and with *P. vivax* as 85 per cent.; and *A. crucians* with *P. falciparum* 75 per cent.

The soluble fluid "Jeysol," which has been put on the market by Messrs. Jeyes' to take the place of the German-made preparation "Lysol," continues to find increasing favour with medical men. "Jeysol" is identical in composition with, and is in every way equal to, "Lysol." It contains 50 per cent. of a specially refined cresylic acid, is an effective solvent of grease, mucus, &c., and does not affect the hands when used in accordance with directions.

Two other sanitary preparations which have recently advanced considerably in popular estimation with our troops are Jeyes' Parasitic Soap and Jeyes' Trench Pomade. The former, dissolved in water, and applied to the seams of clothing and to the body, is a most efficient insecticide. The Trench Pomade is likewise a powerful insecticide, specially prepared for the use of soldiers. The high reputation which this firm has earned for all their sanitary compounds is fully maintained by their latest productions.

Correspondence.

THE CORRECT DOSE OF EMETINE BISMUTH IODIDE.

Sir,—In a leading article on "*Entamœba histolytica:* Possibility of Spread," published in The Journal of Tropical Medicine and Hygiene, February 1, 1917, the dose of emetine bismuth is referred to incorrectly. It is there stated: "Mr. Dobell finds that it requires 36 to 40 gr. of this drug three or four times daily to effect a radical cure." What was really stated in Mr. Dobell's report was as follows: (1) "For treatment to be successful, the drug must be given in large quantities—not less than 36 to 40 gr., in daily doses of 3 or 4 gr. Less than this amount is seldom efficacious, and more may be necessary in individual cases."

The proper method of administering the drug, then, is to give 3-gr. doses every night for twelve consecutive nights, this bringing up the total to 36 gr. in all. In exceptional cases more may be required, and in this case one goes on with the 3-gr. doses for another two or three nights, the total quantity reaching 42 or 45 gr. There is a large amount of emetine in each individual dose, and it is important that this should be known accurately. The statement in the leading article may lead some people to think that the drug is similar to ordinary ipecacuanha and may be given in equal doses.

The article also draws attention to Mr. Dobell's very interesting report, but does not give the title. This is as follows: "Reports upon Investigations in the United Kingdom of Dysentery Cases received from the Eastern Mediterranean. (1) 'Amœbic Dysentery and the Protozoological Investigation of Cases and Carriers.' National Health Insurance. Medical Research Committee. Special Report Series, No 4, 1917."

This report is a very important one, and opens up many interesting possibilities in connection with the disease. It ought to be carefully read and studied by all working at the subject, and especially by those who practise in the Tropics.

George C. Low, M.D,

Original Communication.

BRIEF NOTES ON THE CLINICAL FEATURES OF DISEASES PREVALENT IN UPPER NILE AND SOBAT PIBOR DISTRICT.

By T. Lambie, M.D.
Physician, American Mission, Sudan.

Here are two almost distinct medical districts as regards the diseases most commonly found.

The Shilluks of the Upper Nile are badly infected with a disease which seems to correspond to the classical description of frambœsia.

It may be seen in almost any stage of development. Frequently the primary and secondary stages merge into one. Syphilis is also rampant, and there are a great many border-line cases which are difficult of diagnosis, the circinate eruption of secondary syphilis much resembling the typical yaws of the text-book. The presence of mucous patches I have generally taken as diagnostic. Another point seems to me to be, that the patient with yaws well developed may, and generally is, in good physical condition, although his face, body, legs and arms may be almost completely covered with the ring-shaped raised eruption of yaws. The syphilitic, on the other hand, with a relatively much smaller eruption, is decidedly ill.

Both conditions yield readily to large doses of potassium iodide or to salvarsan or any of its modifications.

Both diseases are conveyed principally through sexual intercourse, and in the case of children through the habit of using a common eating and drinking vessel with their parents, so that we see the primary sore in children usually about the mouth.

I wish to draw attention to the extraordinary prevalence of yaws among the Shilluks of the White Nile, left bank. From native reports and from personal observation during the last nine years the disease is comparatively recent, and yet so widespread has it raged that to-day over one half of the Shilluks of certain large villages are, or have been, infected. I think a certain amount of credit is due to the American Mission for having recognized and endeavoured to combat this pandemic, and although the magnitude of the task and the dense ignorance of the people have given them only a very meagre success, they have unaided done something to alleviate the sufferings of those already infected. I think the subject deserves some Governmental attention, as undoubtedly the neglect of these conditions will (as it has done already) greatly affect the birth-rate and threaten with extinction the finest of the tribes of the Upper Nile watershed.

Coming to the Pibor Sobat district we find a different class of people and different diseases or, at least, different manifestations of what may be the same disease.

One of the most common diseases found in this district is a most destructive and virulent rhinopharyngitis. Beginning with a small ulcer somewhere on the mucous membrane of nose, mouth, pharynx or larynx, it rapidly increases, involving all adjacent tissues, be they skin, connective tissue, bone, muscle, or mucous membrane. Everything becomes involved in this foul-smelling ulcer, which communicates with the nasal sinuses, adding to the general discomfort, also to the Eustachian tubes, and on the face to the muscles of the mouth, even destroying the eye, in which case death may occur from communication with the brain. If it involves the larynx aphonia results. Perforation of the soft palate is almost constant, sometimes it even eats away the hard palate. With one of these I was able to catheterize the Eustachian tube through the mouth. It is a most destructive and deadly disease if it is unchecked. Local applications of strong tincture of iodine and exhibition of huge doses of KI generally give good results, as do the arsenic injections. Mercury is useless. In spite of most heroic medication some die.

The other most prevalent disease is a gummatous periostitis, more or less acute, accompanied with great emaciation, pain and prostration. The bones most frequently affected are in the order named: tibia, radius and ulna, frontal. Usually asymmetrical, yet it is sometimes symmetrical. Usually more than one bone is affected. Sometimes nearly the whole bony system, with the exception of vertebræ, are involved. Frequently the bony masses break down and discharge pus, rarely bone showing osteomyelitis. The text-books speak of only three or four major bone diseases with lesions of this type: Trauma, lepra, tuberculosis and tertiary syphilis; the first three are easily excluded. The conclusion would be that we are dealing with tertiary or congenital syphilis. This is the obvious conclusion, as at first hand 99 per cent. of all doctors would say that both this and the preceding disease are. The surprising point is this, that in the Sobat Pibor district we never see either syphilis or yaws, or, at least, we do not see the primary or secondary lesion of either, just as in thousands of cases examined in this district not more than a paltry dozen or so venereal sores have been seen, and these were tertiary lesions or else the lesions of some other disease, like lepra. In my humble opinion this is most astonishing. A people suffering from the tertiary lesions of syphilis, if indeed it be syphilis, with absolutely no co-existent cases of these, have primary or secondary conditions. I think my experience has been wide enough to be sure of what I say. It seems to me, then, that there are three conclusions; either:—

(1) That some years ago there was a widespread attack of syphilis which has died away, leaving only tertiary and congenital lues; or

(2) That it is a different type of syphilis than the one that we are familiar with. Of course we all have seen and know of individual cases of syphilis in which the original or secondary eruption was either absent or so insignificant as to escape attention, but that this would be consistently so in a series of thousands of cases over a very wide district is hardly possible.

(3) That it is not, or that these conditions are not, syphilis.

You, of course, may add a postulate that my observations are at fault, but in the absence of other medical men on the field I will stick to my guns.

I will not speak of the other diseases common to both fields, as trachoma, with some truly fearful cases of entropion, on hundreds of which we have operated, or of lepra which is fairly common, amœbic dysentery, a very fatal pneumonia, guinea-worm, and various malarial infections.

Lack of all laboratory facilities and the multitudinous other non-professional duties consequential to life and the preservation of happiness in the swamps of the Upper Nile have militated against careful diagnosis, so that we fear at times we have degenerated into the rankest empiricism. This is, of course, unsatisfactory, the only compensation being that we have rendered a bit of help to those who otherwise must have had none.

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Subcutaneous Administration of Fresh Human Blood (P. F. Holm, *Journal-Lancet*, December 15, 1916).—Fresh human blood was injected subcutaneously under various conditions and for different diseases, with apparent benefit. In hæmorrhage of the new-born, hæmorrhage of gastric ulcer, splenomyeloid leukæmia and in pernicious anæmia. In a case of pernicious anæmia, under frequent subcutaneous administration, the blood count went from 30 per cent. hæmoglobin to 85 per cent., and the red blood cells rise from 1,500,000 to over 4,000,000 in the course of a few months. A fairly large amount of blood (4 to 8 oz. or more) may safely be injected into the subcutaneous tissues, and perfect absorption take place if ordinary aseptic technique be employed. Blood which apparently is toxic to the patient when used intravenously may be injected subcutaneously without causing any undue reaction, and with apparent benefit.

Changes in the Blood Picture as Aid to Prognosis of Appendicitis (L. Cardenal, *Siglo Medico*, December 9).—Slight changes in the relative blood count indicate mild infection; a slight increase in the numbers of neutrophiles, and of leucocytes in general, indicates a good organic resistance and mild infection; slight neutrophilosis and pronounced leucocytosis, mild infection and strong resistance; much neutrophilosis and much leucocytosis testify to severe infection but good defence; much neutrophilosis and slight leucocytosis, severe infection and low resisting powers. Any increase in the numbers of neutrophiles with decrease of leucocytes is a sign of increasing gravity of the infection and reduction of the organic defences. The larger the relative proportion of neutrophiles, the greater the probability of pus production. None of his patients with neutrophilosis of 94½ per cent. recovered.

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THE JOURNAL OF

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MARCH 15, 1917.

OPIUM SMOKING IN CHINA.

The article which appeared in the Journal of Tropical Medicine and Hygiene on August 1, 1916, concerning the suppression of opium smoking and its bearings in China has caused some good friends amongst our medical missionary colleagues to put in a word of protest. Their claim is just and quite understandable; for the part taken by missionaries and missionary societies generally is greatly to the credit of both, and has done much to bring about the better state of opinion now prevailing amongst the Chinese as a whole concerning the sale of opium. The letter is written to me, and is marked "Not for publication." I think, however, that the letter ought to have been published, as it is a scathing retort, written, however, in the best spirit, upon the line of argument followed in the leader in question, in an endeavour to show the deep-rootedness of the German intent to oust the British in China. The missionary societies are, in the article, held to have acted as unknowing agents towards that end by helping to ruin the opium trade of India.

No upright-minded man who has seen the evil consequences caused to China by the practice of opium smoking, as the missionaries in the interior of China have, would find any scruples of conscience in killing the traffic of opium between India and China. In this the missionaries and others were acting unselfishly, and but doing their duty as Christians in the country which they were doing their best to regenerate. There is no fault to find, but instead every praise and credit to be given to the men and women who, seeing the evil, did their best to remove it. It is one of the great blessings, amongst a host of others, that missionaries and missionary societies have conferred upon China, and every Chinese patriot is appreciative of the benefit to their country in helping to free it from what has long proved a crying evil and dark spot in their national character.

That the Chinese smoked opium before it was openly brought in British ships from Calcutta to China is of course well known; that in China opium may continue to be smoked for some time to come at any rate is also, unfortunately, to be contemplated; but the position in which British well-wishers to China found themselves was that, whilst condemning the opium-smoking habit, the Chinese naturally retorted, "Then why is the drug allowed to be brought into our ports from the British Empire, in British ships, and authorized to be sold in British ports and concessions to our countrymen?" This argument blunted the endeavour of well-intended British folk who had the interest of the Chinese sincerely at heart. How did the subject become so acute during recent years? Largely because the opium was brought openly in British steamers. Previously the drug was conveyed from India overland and by way of Burmah especially, to China. When, however, faster sea traffic came into vogue and steamers ran direct to China from India, the traffic came then under the direct ken of all nations, and Britain was held up as the guilty party before all the world.

In meetings held in Exeter Hall, London, and in other centres in Britain, the name of Britain was denounced by her own fellow-countrymen in no measured terms; so virulent were these attacks that many so-called level-headed and even-minded men resented the attacks, and became alienated from their support of missions to China. On the other hand, many adherents were gained by these denunciations, and the missions benefited in the long run. The criticism was "Let our missionaries cease dabbling in a question which is largely political and preach the Gospel which is their business." But the preacher held that preaching the Gospel to a people largely soddened by opium was futile, and until that evil was rooted out a great stumbling-block to success was in the way; and if it could be removed it was their duty to do so. Many held that the "opium war" (1860), as it was styled, was not about opium at all. The statement put forward that opium was forced upon China by British bayonets was another much-resented doctrine by British folk, for history, they held, does not justify such a conclusion. Strong language no doubt had to be employed to bring the matter home, and when once the people at home grasped the situation there was no hesitation, and the Governments of both Britain and India dealt with the matter speedily. Yet not so speedily as many wished. The Government of India proceeded to lessen the export gradually, and arranged that in a few years the export of opium from India to China should cease altogether. They struck at the root of the matter by lessening the growing of opium in India and agreeing to stop the growth of the poppy altogether, except in so far as it was necessary for medicinal purposes. This was again objected to, and an endeavour was made to compel the Indian Government to stop all growing for export purpose at once. The Indian Government, not wishing to have a large number of people condemned to starvation, had planned that the procedure should be carried out gradually, but yet they agreed to hasten the period of curtailment, and did so with great loss to the revenue.

Such would seem to be the history of the opium question between India and China, and there are two groups of people who have to be congratulated: first, the missionaries who brought the evil before the public in Britain, and secondly, the Indian Government, who, much traduced for their part in the traffic, responded in a way which, it is safe to say, would not have been done by any except British folk. The part the German played in the matter is outside the primary causes; but that it helped to stigmatize Britain in the eyes of the Chinese as an enemy was done, from what we now know of the Teuton and his ways, for political and commercial purposes, and not in any way as a friend of China.

Those in power in China now will support the British missionaries in their effort to stop opium smoking amongst their countrymen. The hue and cry against Sun Yat Sen by Europeans in China had much to do with the opium question, as his doctrines upset revenue and dealt a blow to a lucrative trade. This outcry was not confined to the business circles unfortunately, and for a time this man, China's hope and saviour, was traduced and slighted, accused of immoral and corrupt practices, and had to seek shelter as an exile until better counsels prevailed.

It is gratifying to know from reliable sources that the Chinese authorities and all the Chinese who are aware of the evils of opium smoking amongst their countrymen are by example and by precept doing their best to discourage the habit. In social gatherings anyone who smokes opium nowadays in China is looked at askance and his company is shunned. Heavy fines are imposed by the Chinese authorities upon anyone dealing in opium. Even if a man in his own house smokes opium, the informant who comes forward and tells the authorities of the fact is rewarded, a state of things which shows how earnest the Chinese are that the smoking of opium shall be thwarted at every turn. In time no doubt these means will tell and the custom will become obsolete. For this state of things the Chinese have largely to thank the missionaries, for through them the evils become known publicly. It is also a matter of congratulation that even at great sacrifice of revenue the Indian Government dealt with the exportation of opium to China in a manner which commends itself for all time.

J. Cantlie.

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Abstracts.

SUBACUTE AND LATENT INFANTILE SCURVY. THE CARDIO-RESPIRATORY SYNDROME (A NEW SIGN).[1]

By Alfred F. Hess.

When the use of orange juice was discontinued in the dietary of a group of infants who were being fed on milk which had been subjected to a temperature of 140° F. for thirty minutes, some of them in the course of from two to four months showed signs of mild scurvy. That these manifestations were in reality scorbutic, and furthermore, that they were attributable to the pasteurized milk, was proved by their rapid disappearance when orange juice was again added to the dietary, or when raw milk was substituted for the heated milk. The practical deduction from these observations is not, however, that pasteurization should be discouraged, or that milk treated in this way is objectionable, but merely that the important fact should be recognized that it is not a complete food for infants, and that it is imperative to give an antiscorbutic substance in addition. When this prophylactic measure is observed, fresh pasteurized milk becomes a most valuable food for infants, and is to be highly recommended on account of the security which it affords. Scurvy brought about in this way is not at all infrequent, it is indeed the most common cause of scurvy, and it induces a type of the disorder which generally passes unrecognized. If we are to diagnose scurvy promptly, and not overlook its more subtle manifestations, the classic text-book description of this disturbance must be supplanted by one which is less crude and more faithful to true clinical conditions.

The stereotyped picture of infantile scurvy, and the one which this term commonly suggests, is that of a poorly nourished infant, lying with one or both thighs flexed on the abdomen, who, on closer examination, is found to have bleeding, spongy gums, and enlargement of the lower end of the femur, associated with exquisite tenderness. This is the florid type, encountered only occasionally, and requiring merely a routine physical examination for recognition. The commoner form, which may be termed "subacute infantile scurvy," is composed of a large number of symptoms which are inconclusive individually, and may well escape a correct interpretation. The affected baby is usually in the second half of the first year of life, and does not gain or gains but slightly for weeks. It may be fairly well nourished, but is pale, with perhaps slight œdema of the eyelids. The mother or nurse complains that the child is irritable and peevish, and that the appetite has diminished. The gums may show merely a lividity or slight peridental hæmorrhage, which on subsequent examination is no longer visible, and may have consisted merely of a rim of crimson edging the borders of the upper gum, or perhaps have been situated behind the upper incisor. On closer examination it may be observed that the papillæ of the tip of the tongue are markedly congested, and that a petechial spot is to be seen on its frænum, on the palpebral conjunctiva, or here and there on the surface of the body, more especially where there are erosions, eczema, or other skin lesions.[1] Attention may be called to tenderness of the lower thighs, which in some instances is definite, in others so ill-defined and fleeting that it is impossible to feel convinced of its significance or even reality. There may be slight œdema over the crests of the tibia, of the kind which does not pit on pressure. The knee-jerks are almost always markedly exaggerated. The urine is found to be normal or to contain some albumin and red and white blood cells.

These symptoms do not constitute a rigid entity, but are subject to manifold variations. The syndrome may be rendered less typical and more difficult by the fact that the infant has gained steadily rather than lost in weight, as is sometimes the case, particularly if the food has been insufficient in quantity during the first few months of life. There are other symptoms worthy of note, especially those which have been disclosed by the aid of the Röntgen ray. The heart may be involved in infantile scurvy; this may be evident to ordinary physical examination, as enlargement, especially to the right, and may be accompanied by dullness and diminished breathing posteriorly at the bases of the lungs. This type of enlargement is often well shown in röntgenograms, as well as a marked broadening at the base of the heart, at the site of the large vessels. As far as I know, attention has never been called to the latter phenomenon, and it will be referred to below in another connection. Röntgenograms of the bones may show the "white line" at the epiphyses, or a thickening of the periosteum. However, too great reliance should not be placed on these signs in making an early diagnosis of this disorder, as neither are invariably present.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, January 27, 1917.

[1] The extent of the petechiæ and other hæmorrhages in infantile scurvy depends on the individual predisposition of the child in this regard. As has been pointed out, this sign is due mainly to a weakness of the vessel wall, and not to an alteration in the coagulability of the blood. In infants who show an instability of the capillaries, as manifested by the "capillary resistance test," the disorder is apt to be characterized clinically by the various typical signs of hæmorrhage.

An example of a case of subacute scurvy, which in many respects is typical, is the following:—

Case 1.—I. F., girl, was admitted when three months old, weighing somewhat over 8 lb. She was given Schloss milk, 4 oz. and then 5 oz. every three hours, and did well, weighing 11¼ lb. two months later. As she failed to gain for some weeks, although 6 oz. of food were given, it was thought that this might be due to the fact that she was getting pasteurized milk, and that she had never received an antiscorbutic. Autolyzed yeast was tried as a prophylactic antiscorbutic. This failed to cause a gain. When, however, orange juice was substituted for the yeast a prompt growth reaction resulted, a gain of 1¼ lb. in four weeks. Accompanying this lack of gain in weight there were many of the other symptoms enumerated above; irritability, pallor, slight tenderness of the lower ends of the femora, albumin and a few red and white cells in the urine. The pulse or heart beat was frequently over 150, and the respirations 60. The diagnosis of subacute scurvy was substantiated by the prompt subsidence of all symptoms when orange juice was given.

Among the symptoms mentioned in this case are a pulse of over 150 and respirations of 60 a minute. These phenomena were noted in several instances before their significance and intimate relationship with infantile scurvy was realized. They were then made the subject of closer observation, and were found to occur frequently as early signs of this disorder. In one instance of subacute scurvy the pulse could not be counted, and the heart beat was found to be 200 to the minute. It should not be thought thát this must have been a severe case; on the contrary, the baby was in good condition, did not appear ill, and merely showed some tenderness of the thighs, and red blood cells in the urine as other evidences of its ailment. When given orange juice there was a remarkable response in gain in weight and a disappearance of the other symptoms. The rapidity of respirations is perhaps a more delicate indicator of this disturbance than the pulse, and has been found to be markedly affected when the latter was merely slightly increased in rate. For example, in one instance the respirations were 64, 60 and 64 on three successive days, while the pulse was 124, 141 and 136; in other words, there was a 2:1 instead of the normal 4:1 pulse-respiration ratio. There are several points; first and foremost is a reaction, the sharp drop in the pulse and in the respiration rate when orange juice was given. This is the essence of the phenomenon; a response which proves that it is dependent on and the result of the scorbutic condition. After orange juice had brought about this reaction potato was substituted, and was able to enhance the effect still further. It did this not only as regards the pulse-respiration syndrome, but also as regards the other scorbutic manifestations. This raises the question as to possible differences between the various antiscorbutics, and from which the inference was drawn that they are not all exactly alike in their chemical nature or therapeutic action. My opinion on this question is further strengthened by the secondary beneficial results which may follow the administration of vegetables in cases of scurvy in which orange juice has been taken for some weeks. On giving orange juice, not only were the pulse and the respiration affected, but the temperature as well. It would seem as if this disorder incited a mild febrile reaction, which yielded promptly to antiscorbutic treatment, and should therefore be regarded as scorbutic in nature; in other words, as a *scorbutic fever*.

There is little to be stated in addition concerning the type of the tachycardia. The pulse is regular and moderately strong, and its rapidity is heightened unduly by the incidence of minor intercurrent infections. Cardiographic tracings showed a simple tachycardia, such as is common to exophthalmic goitre, with the T-wave exceptionally tall in some tracings.

The increase in respirations is a polypnœa rather than a dyspnœa. The baby lies apparently in comfort while the respirations number 60 a minute. It is probably due to this lack of visible disturbance, this superficial appearance of normal cardiac and respiratory functioning, that these signs have escaped observation.

Without doubt this cardio-respiratory syndrome is occasioned by a disturbance of the nervous mechanism controlling this dual system. In view of the fact that the action of the lungs as well as that of the heart is affected, there can be no question of the symptoms being attributable to a primary muscular alteration. Nor can they be ascribed to anæmia. Infantile scurvy is generally accompanied by only a mild grade of secondary anæmia. Furthermore, observations carried out to control this point have demonstrated that poorly nourished infants with more marked anæmia have approximately a normal cardiac and respiratory rate. Moreover, the fact that these symptoms yield precipitously in forty-eight hours to antiscorbutic diet does away with all questions of their dependence on malnutrition or anæmia. The phenomenon is clearly neurotic in nature and probably due to an involvement of the pneumogastric nerves. We have here, therefore, one more link of evidence that the nervous system is involved in infantile scurvy, and that this disorder should no longer be regarded as affecting only the bones and the blood-vessels, or as one characterized clinically by subperiosteal swellings and hæmorrhages in various parts of the body. The optic nerve may show changes, and that it is quite common to find the knee reflexes exaggerated. The significance of showing that infantile scurvy possesses an aspect which requires it to be regarded as a disease of the nervous system is interesting in itself, but gains far greater importance when we consider that this association brings it into closer relationship with beriberi, adult scurvy, pellagra and the ever-increasing group of disorders which are classed as "deficiency diseases." In beriberi, as well as in infantile scurvy, there is enlargement of the heart, especially of the right heart,[1] and there are tachycardia, polypnœa, and generally increased knee-jerks. In adult scurvy we find dyspnœa, palpitation, and hyperæsthesia frequently described. Attention has been drawn, from time to time, to the close clinical relationship between adult scurvy and beriberi by various observers who have noted cases of these disorders manifesting themselves under apparently identical conditions. Only recently this was once more reported by a military surgeon in relation to the troops in Mesopotamia and the Dardanelles.[2] In tracing relationship with pellagra, in this disease the pulse is frequently rapid, and also that pathologic and even clinical changes have been found in the central nervous system. As is well known, skin lesions are also one of the characteristic signs of pellagra. It is therefore worthy of comment that in infantile scurvy redness of the skin is not infrequently associated with œdema over the tibia; this was the case in sixty-nine of 190 instances of œdema. It is also of interest in this connection, that there is an eczema which develops in infants in the course of scurvy which yields promptly to antiscorbutic treatment.

It is evident that previous to the onset of scurvy there must be a period during which the equilibrium of the essential substance or "vitamine" is no longer being maintained, but, on the contrary, a negative balance is in progress. Although at the onset this abnormal state of metabolism is of no clinical moment, if it continues it gradually brings about a condition of "latent scurvy." This nutritional state may constitute merely an introductory phase to the occurrence of subacute or of florid scurvy. It may, however, advance no further; the negative balance may be slight, and the supply of "vitamine" sufficiently great to maintain the body in the latent scorbutic condition for months, until, quite unintentionally, it is brought into equilibrium by the addition of some antiscorbutic foodstuff to the dietary. Latent scurvy may remain latent; it may gradually merge into subacute scurvy and develop no further, and, finally, the typical gradation may ensue, of latent, subacute and florid infantile scurvy.

The diagnosis of latent scurvy is based mainly on the reaction to specific therapy, and on the marked improvement when orange juice, potato, or other antiscorbutic food is taken. The symptoms themselves are suggestive but do not permit a definite diagnosis. In my experience the course has been as follows: The infant generally has been from six to nine months of age, and has been fed for a considerable period on pasteurized milk; this may or may not have been prepared with cereal decoction, nor did it seem material whether or not gruels also had been given. When about six months of age the baby ceased to thrive, to gain satisfactorily, to look strong and to eat as we should desire. The most careful physical examination has failed to solve the difficulty. On the other hand, the history of a diet of heated milk and lack of antiscorbutic food, considered in conjunction with the pallor and lack of appetite, the increased knee-jerks, and perhaps the cardio-respiratory syndrome, has awakened suspicion and led us to prescribe orange juice, with a view to diagnosis as well as treatment. The result frequently has been magical.

Case 2.—H. C., boy, born December 15, 1915, was artificially fed until admitted to the institution, January 4, 1916, when he weighed 6½ lb. He was given 28 oz. of Schloss milk a day. (This was prepared from pasteurized milk which was not heated a second time. It contains per litre (quart) 140 c.c. of whole milk, 140 c.c. of 20 per cent. cream, 50 grm. of dextrimaltose, 5 grm. of plasmon, 0·2 grm. of potassium chlorate, and 700 c.c. of water.) By March 1 he weighed 9 lb., and gained ¾ lb. more in the course of this month. During April he gained only 4 oz. There was almost a cessation of gain from April 10 to May 3, although yeast was added to the diet. May 2, orange juice was given. The weight advanced at once, the general appearance quickly improved, and an eczematous condition of the face rapidly healed. All this occurred, although the intake of food remained the same.

Epicrisis: A baby four months old with latent scurvy, which had existed since or even before it was three months of age.

This disorder may occur in older infants under similar dietary conditions. The following case relates to a well-nourished, active, contented baby over a year old. A diagnosis was impossible from the signs and symptoms, but was suggested by previous experience with the results of a prolonged diet of heated milk.

Case 3.—E. F., girl, admitted when four months old, weighing 9½ lb., had never been nursed. She gained on a mixture of two-thirds milk, and was given orange juice when six months of age, and vegetable a month later. February 1, 1916, when she was nine and a half months old and weighed 16½ lb., orange juice and vegetable were discontinued, and a cereal containing wheat embryo (germ meal) substituted. She had grip, associated with otitis and adenitis, during the latter part of February, and again in March and the early part of April. By May 14, however, she weighed 19 lb. and showed no scorbutic signs whatever. About this time the watery extract of the germ meal was added to the diet in place of barley water (12 oz. a day). During June the gain fell off markedly, but the baby appeared well otherwise. Whole milk was ordered to offset this in the beginning of July, but did not bring about a gain. Then orange juice was added. Later vegetable was substituted for orange juice, and occasioned an increase in weight which lasted for many weeks.

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[1] In a recent report of Röntgen-ray examinations of Russian captives suffering from beriberi and disorders resembling beriberi, P. Reinhard (*Arch. f. Schiffs- u. Tropen. Hyg.*, 1916, No. 1, p. 20), states that he found primary dilatation of the shadow of the large vessels, especially of the pulmonary region. This is similar to the röntgenographic picture which I have described above occurring in infantile scurvy.

[2] Willcox, W. H.: "Beriberi, with Special Reference to Prophylaxis and Treatment," *Lancet*, London, 1916, 1, p. 553.

This condition of latent scurvy is probably the commonest type of the disorder, especially in the larger cities where almost the entire milk supply for infants is pasteurized, and it is frequently passed over unrecognized. Most infants happily are given orange juice by the time they are six months of age, and may receive a small amount of vegetable or potato before they are much older, so that they are protected from serious harm in this way. But there is no doubt a considerable number, including those who are peculiarly susceptible, who pass through the state of latent scurvy. If these cases were included in the computations, we should not class infantile scurvy as a disorder which very rarely occurs during the first six months of life. The lesson taught by these observations is not that fresh milk for infant feeding should not be pasteurized, but that the administration of antiscorbutics should be begun earlier. There is no reason based on clinical experience which contraindicates the giving of a teaspoonful of orange juice at one month to bottle-fed babies, and of gradually increasing this amount to a tablespoonful at the age of three months. As has been repeatedly shown, there is, on the contrary, a valid reason for urging the adoption of a prophylactic measure of this kind for infants fed on the pasteurized milk as supplied at present.

Conclusions.

An exclusive diet of pasteurized milk will frequently induce scurvy in infants. It should be well understood, however, that this danger can readily be averted by the mere addition of an antiscorbutic food to the dietary.

Probably a large proportion of infantile scurvy is occasioned at present by our pasteurized milk. This scurvy is usually not of the classic, florid type. It is less pronounced and obvious, and is consequently the form which is least often recognized. This type may be termed "subacute infantile scurvy," and is distinguished by a group of incompletely developed symptoms which disappear quickly when orange juice or other specific therapy is given.

Another type found to be occasioned by this milk is "latent scurvy." This constitutes a state of malnutrition which develops slowly as the result of a negative balance of "vitamines." It can rarely be definitely diagnosed, except by the sharp recession of symptoms—stationary weight, pallor, poor appetite, &c.—following the administration of an antiscorbutic.

We should no longer regard infantile scurvy, from either a pathologic or a clinical point of view, as a disorder affecting merely the blood-vessels and the bones. Röntgenograms show that the heart, especially the right heart, is frequently enlarged, and that there is a broadening of the shadow at the base of the heart, at the site of the great vessels. Furthermore, this disorder is associated frequently, even in the mild forms, with a cardio-respiratory disturbance characterized by a very rapid pulse, and respirations which may rise as high as 60 a minute (polypnœa). Both of these signs disappear promptly when orange juice or potato is given. This cardio-respiratory syndrome is due to an involvement of the nerves. Considered in conjunction with the changes of the optic disc, previously described, and the increasing of the knee reflexes, it is evident that the nervous system is extensively involved in infantile scurvy. This fact gains added interest in view of the marked involvement of the nervous tissue in other so-called "deficiency diseases," such as adult scurvy, beriberi, and pellagra.

DHOBIE ITCH AND ECZEMATOID RINGWORM OF THE EXTREMITIES.

By J. M. H. Macleod, M.D., F.R.C.P.

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In an article in the *Practitioner*, February, 1917, Dr. Macleod dealt with a type of ringworm not the familiar ringed type, which is so common in children, but the eczematoid ringworm of the extremities, and the ringworm of the inguino-crural regions, known as tinea cruris, eczema marginatum, and, in India —where it is particulary rife—as dhobie itch.

The fungus which is responsible for the majority of cases of eczematoid ringworm of the feet and hands is the epidermophyton inguinale of Sabouraud —the fungus which causes tinea cruris.

The epidermophyton inguinale has a predilection for moist, warm, intertriginous parts of the body, and may attack not only the groin and extremities but the axillæ, occasionally the umbilical fold, and beneath the breasts in stout women, while in a certain number of cases all these different regions may be involved. The most common regions to be attacked in their order of frequency are the groin, axillæ, feet, and last, the hands. In a considerable number of cases the lesions on the groin are cured first, while those on the feet and hands may persist long afterwards, so that in ringworm of the extremities there is frequently a history of ringworm of the crutch having been present some time previously. In a case, which obtrudes itself upon my memory, a patient with ringworm of the feet gave a history of having had dhobie itch in India some twenty years previously, and his feet, he said, had troubled him off and on ever since. He had been told that he was suffering from gouty eczema of the feet and had undergone all manner of treatment, local, dietetic, medicinal, and balneological, but without success.

Mycology.

The epidermophyton inguinale (Sabouraud), which is the common cause of this type of ringworm, is peculiar in that, however widely it may spread over the skin, it never attacks the hairs. It is not easily cultivated and grows slowly. On Sabouraud's proof-agar medium it takes about a week to develop, and appears first as a small, greyish-yellow, powdery culture which gradually assumes an acuminate shape. A few weeks later whitish downy tufts appear, which eventually overgrow the culture.

A variety of the epidermophyton inguinale was isolated by Castellani from a foot case; this gave pinkish cultures, and was named in consequence *E. rubrum*. It was probably the same fungus which was named by Bang *E. purpureum*.

Demonstration of the Fungus.

The diagnosis rests with the demonstration of the fungus. For this purpose a scale is detached by forceps or a blunt scalpel, placed with the deep side uppermost on a microscope slide and covered with a drop of liquor potassæ, a cover slip is applied, and the specimen gently heated and allowed to stand for a quarter of an hour, then examined with the high power. If positive the fungus can be seen as branching mycelial threads and chains of spores ramifying among the horn cells. It may be necessary to make a number of specimens before a positive one is obtained.

Pathogenesis.

The epidermophyton inguinale on reaching the cutaneous surface proliferates, and its mycelial threads gradually insinuate themselves between the cells of the horny layer of the epidermis, where they eliminate a ferment which has a solvent action on the keratin of the cells, causing their dissolution, and at the same time exerting a toxic effect which results in a definite inflammatory reaction in the upper part of the corium. This reaction, if mild, consists simply of a dilatation of the blood-vessels of the papillary and sub-papillary layers with an extravasation of serum and a cellular deposit of lymphocytes and possibly of a few polynuclear leucocytes. Where the toxins produced by the fungus are more virulent, however, the serous exudation may be so profuse as to lead to the formation of vesicles which rapidly become transformed into pustules.

Although the lesions in the feet, hands, groin, &c., are due to the same fungus and have the same essential characteristics, they are so modified by secondary considerations, such as their situation and the degree of heat and moisture of the parts involved, that it will be advisable for the sake of clarity to describe the eczematoid ringworm of the hands and feet separately from that of the groin and axillæ.

Eczematoid Ringworm of the Extremities.

The clinical appearances presented by eczematoid ringworm of the hands and feet vary considerably in different cases. The essential lesion is a pinhead-sized, deeply seated vesicle, which has been compared to a sago grain embedded in the epidermis. A varying number of these vesicles make their appearance, sometimes grouped, at other times irregularly and widely distributed. They are irregularly situated on healthy skin and not surrounded by an inflammatory halo unless when they become contaminated with pyogenetic cocci and purulent. In a few days the vesicle dries up and the roof comes away as a scale, leaving a denuded, shiny, sometimes moist surface surrounded by a free or upturned scaly edge. Occasionally the vesicles coalesce to form blebs which may reach the size of a sixpence or larger, and these in turn give rise to irregular areas of considerable extent. About the soles of the feet the fungus may produce coarse scales and horny thickenings, or between the toes may give rise to a thickened white sodden skin somewhat like parchment.

Three main clinical types of eczematoid ringworm of the extremities may be described, but these merge into one another, and all varieties of lesions may occur in one case.

(1) An acute vesico-bullous type which tends to attack chiefly the interdigital clefts, spreading from there on to the dorsum of the foot or back of the hand in the form of erythematous patches, with a more or less definite border which may be scaly or dotted over with small vesicles or vesico-pustules.

(2) A chronic variety which may succeed the acute type, with indefinite scaly patches, the scales of which tend to be loose at the margin and to fall off, leaving a raw glazed surface.

(3) A thick scaly variety affecting the soles of the feet and, more rarely, the palms of the hands, in which the horny layer is thickened in patches and sometimes fissured. The edges of the patches are irregular and often detached, and beyond them may sometimes be present an erythematous areola and small vesico-pustules. Between the toes the horny thickening appears as white, moist, and sodden skin, and the fissures are chiefly marked in the folds of the toes. The interdigital space most frequently affected is the fourth, owing to the fourth and fifth toes being kept more close in apposition to one another than the others, and so forming a suitable place for incubating the fungus.

In some cases all four extremities may be involved, while in others it may be confined to the hands or the feet, and not infrequently to only one member.

In association with the skin lesions the nails are liable to be implicated and to become, in consequence, discoloured, thickened, and brittle, and sometimes raised and turned up at the free border, owing to a scaly accumulation on the underlying nail-bed.

The affection is more common in the feet than in the hands, doubtless because the feet are less frequently and thoroughly washed, and because the interdigital clefts being closed up by the boots are more likely to harbour the fungus, and, if warm and moist, to stimulate its growth.

The subjective symptoms vary according to the acuteness of the condition. In the vesicular type there may be more or less itching, and when fissures are present in the folds of the toes, they may be so painful as to interfere with walking. This type of ringworm is always aggravated by heat, either from hot weather or from the exercise of walking or running.

Diagnosis.—In the hands the acute variety has to be distinguished chiefly from dysidrosis, and the squamous type from scaly eczema, while on the soles of the feet the horny desquamating type may be confused with a scaly tertiary syphilide. Apart from the clinical differences which may help to distinguish it from those conditions, the final diagnosis can only be made good by the demonstration of the fungus.

Treatment.—The condition shows no tendency to heal spontaneously, though, as stated above, it may die down and lie dormant during cold weather. When the affection is acute or purulent, the inflammation should first be reduced by the continuous application of boric compresses, followed by the use of a dusting powder consisting of salicylic acid, one part; boric acid, four parts, and zinc oxide, four parts. Later, a curative ointment should be applied twice daily, such as oxidized pyrogallol, 15 gr.; glycerine of starch, 2 dr.; soft paraffin to the ounce. This ointment is effective but dirty, and instead of it an ointment such as that suggested by Whitfield —containing benzoic acid, 5 per cent., salicylic acid, 3 per cent., in soft paraffin and cocoanut oil— gives excellent results.

The most intractable type of all is the scaly and interdigital variety in the feet, with the white thickened skin between the toes. In it the affected parts should be rubbed with soft soap and warm water previous to the application of the salicylic-benzoic ointment. In some cases even this may be insufficient, and it may be necessary to resort to such strong measures as the application to the whitened skin of a saturated solution of salicylic acid in spirit, or of salicylic plaster between the toes.

The socks should be made of white or natural coloured wool and changed twice daily, the above powder being dusted freely into them before they are put on. After being worn they should be thoroughly washed or, preferably, stoved. The boots should also be dusted inside with the powder, and should be swabbed out occasionally with a 1 in 20 solution of lysol so as to destroy any fungus which may be harboured in the moist leather, as it is possible for it to persist there, and to work its way through the sock and re-infect the feet.

Ringworm of the Genito-crural Region.

Ringworm of the genito-crural region is particularly common in warm climates, such as India, Burmah, and China, and is usually due to the epidermophyton inguinale. It was most probably introduced into this country by people coming from the East, and became much more common here after the return of the soldiers from the South African War. The increase of cases has been still more noticeable during the present War.

Clinical Characteristics.—It begins as slightly raised, rounded, elevated papules situated about the fork, which, owing to the moisture of the part, instead of being scaly, are liable to present a raw, sodden appearance. These papules spread peripherally, the border becoming raised and well-defined, and tend to coalesce to form irregular patches with a festooned edge which is sometimes covered with thick scales, or at other times dotted over with oozing papules or vesico-pustules. Not infrequently the affected skin becomes broken at the folds, and painful fissures result. Occasionally the patches clear up in the centre to form circinate lesions, or a sub-acute type may be met with, in which there are red scaly areas with a well-defined, slightly raised margin

The affection may be limited to the inner surfaces of the thighs and folds of the groins, or it may attack the genitalia, and, in extensive cases, may involve practically the whole of the bathing-drawers area. Though it may encroach on the pubic region, the hairs are never affected. It is not infrequently present also in the axillæ, in the umbilical folds, or beneath the breasts in women, where it presents the same clinical appearances as in the groins. In the warmth and moisture of these regions the fungus grows rapidly and gives rise to considerable irritation; this is further aggravated by the friction of the clothes, and so sore may the affected areas become that the patient may be forced to lie up. The itching leads to scratching, and the lesions are apt, in consequence, to become eczematized or inoculated with pus cocci, and the ringworm to be complicated by septic dermatitis or boils. The irritation is naturally worse in hot weather, and when the patient is warm in bed or from exercise. The affection has a tendency to improve in the cold season, and may disappear or dry up to form scaly negligible patches, but it usually reasserts itself with the return of warm weather.

The exact manner in which it is contracted is, as a rule, uncertain. The fungus may be transmitted directly from one individual to another by contact, as in the case under my care, in which a wife was infected by her husband. It may also spread indirectly from the wearing of infected clothes, the use of infected water-closet seats, &c. It has even been suggested that it may pass through the clothes to the skin. It is possible that, in some cases, the strong belief in India that the dhobie or washerman is responsible for its spread may not be ill-founded. The native custom of washing clothes in pools of stagnant water, in which they may be mixed up with infected clothes, suggests an explanation, but the final proof of this is incomplete, for, as far as I am aware, the fungus has never been demonstrated in clothes returned from the wash. The objectionable habit of wearing trousers next to the skin is a likely way of keeping up the infection, for they are not so frequently cleaned as underclothing.

It is much more common in men than in women, and in institutions of which both men and women were inmates it has been known to attack the men alone. This is difficult to explain, for, if it were often caused by contaminated water-closet seats, it ought to be as common—in this country at all events—in women as in men. Of course, it is probable that a considerable number of cases do occur in women which do not come under medical observation.

Diagnosis.—The diagnosis does not present any great difficulty when the lesions are well-marked and have the characteristic abrupt festooned edge, but when they are less well defined and have become eczematized or septic considerable difficulty may arise.

It has to be distinguished from the reddish patches of simple intertrigo—the result of chafing and the growth in the skin of a slightly virulent streptococcus—but in this condition the lesions are not definitely raised, are less well demarcated, and are not so scaly.

Erythrasma has been confused with it, a condition due to a minute hyphomycetes, in which, however, the only symptoms are a brownish discoloration of the skin covered by fine scales.

Eczema of these parts may resemble it, but the patches of eczema are more diffuse, tend to weep, and are apt to be associated with œdema and thickening of the neighbouring parts where the subcutaneous tissue is loose, such as the scrotum.

As in the case of eczematoid ringworm of the feet, the final diagnosis rests with the demonstration of the fungus.

Treatment.—This type of ringworm, as a general rule, is difficult to cure, and active remedies are necessary to stamp it out. The affected region should, in the first instance, be scrubbed with warm water and soft soap to remove the crusts, scales, and discharges; in mild cases this should be followed by the application of a 5 per cent. pyrogallic or a 3 per cent. salicylic and benzoic ointment. This treatment should be carried out at night, and in the morning the grease should be wiped away, when a 10 per cent. solution of tincture of iodine in spirit is applied, or the skin is dusted with a salicylic and zinc dusting powder.

During the treatment small cotton bathing pants should be worn, which should be changed frequently and sterilized by stoving. In more resistant cases the time-honoured Velmincj's solution of sulphuret of calcium (1 oz. of quicklime, 2 oz. of precipitated sulphur, and 15 oz. of water, are boiled together in an earthenware vessel, then reduced to 10 oz., and the clear sherry-coloured fluid is decanted after subsidence) may be employed, and should be painted on every night for a week; this will generally be followed by recovery. It is in such cases that chrysarobin has been found to be of great value. It is best applied in the form of a 2 to 6 per cent. ointment rubbed in, twice daily, till the skin around the affected patch reacts and becomes red and inflamed; the rubbing is then stopped, for the reaction generally indicates that a cure has been effected. It is necessary in employing chrysarobin to warn the patient that the drug stains the clothing, and that, as it is a powerful irritant, it must not be allowed to reach sensitive parts, like the eyes or the vulva.

Where fissures are present they may be healed by painting with Friar's Balsam, or with a 2 per cent. solution of nitrate of silver and spirit. For at least a month after the active treatment has been discontinued, and the lesions have apparently healed, the part should be painted over several times a week with a 10 per cent. solution of tincture of iodine in spirit to prevent recrudescence, and on alternate days dusted with a salicylic and starch powder.

A PRELIMINARY CONTRIBUTION ON "P.U.O." (TRENCH FEVER).[1]

By F. C. Davies and R. P. Weldon.

The clinical characters markedly shown in typical cases, and which, in certain respects, are not unlike attacks of malaria, are sudden onset, occasionally with chill. Onset with indefinite but well-marked weakness and malaise, frequently indescribable so far as the patient is concerned, who, when pressed to an extremity in so many instances, says, "Well, my legs would not hold me."

Pyrexia, severe or slight, irregular, tending to intermit, and with a well-marked suggestion of periodicity of from two or three to five days. Pains, characteristically lumbar, head or legs, all or any, at onset, "shins" later and with extraordinary consistency; vomiting may occur. In character the pains are best exemplified in these so-called "shin pains," and are of a severe boring character and neuralgic in type, being very frequently associated with marked tenderness of the nerves of the calf, including the external popliteal, where it passes round the neck of the fibula, where it is frequently exquisitely tender to pressure. The pains are not necessarily confined to the shins, but may extend above the knees as far as the thighs, *missing the joints*.

Certain negative signs and symptoms of great value, when differentiating from the minor maladies, are freedom from catarrhal conditions of the upper and lower respiratory tracts, absence of dryness or furring of the tongue, even with a temperature of 102° or 103° F. The pulse is remarkably stable, and the general feeling of the patients whilst in bed is summed up best in the words they frequently used, "If it were not for this headache I should be all right," or, "If it were not for these pains in my back I should be all right"—a mental attitude which is, in the opinion of the authors, unheard of in the typhoid and paratyphoid infections. The spleen is certainly not usually appreciably enlarged either to palpation or percussion. Bowel symptoms we believe not to be characteristic of the condition, though frequently amongst troops, as one would expect, one sees it associated with slight attacks of diarrhœa.

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[1] Abstracted from the *Lancet*, February 3, 1917.

In the majority of cases at least three exacerbations of fever take place extending over an interval of *not less than two weeks*. The pains are, unquestionably, frequently severe and persistent, though not disabling. The blood shows an absence of any ascertainable growth on ordinary media. A count shows moderate leucocytosis only, with some increase of the large lymphocytes, and an absence of eosinophilia and shows no recognizable hæmatozoa.

It is important to take into consideration all the aspects of the case and not to rely upon the presentation of a typical temperature chart or the presence of typical "shin pains" or any other single characteristic, a mistake which is frequently made. This condition is a disease of undoubted individuality quite distinct from, and in the vast majority of cases easily differentiated from, influenza, common cold, bilious attack, and myalgia, on the one hand, and the enteric group, malaria, and rheumatic fever on the other, and, in its typical instances, as easily diagnosed as any better known disease, and in its atypical cases well recognized by those who have studied such numbers of cases as the medical division of any large base hospital must provide.

With regard to treatment, it would not appear that any remedies yet tried have materially modified the course of the disease. From the clinical fact that direct transmission in hospital appeared not to exist, it seemed to us that the direct transmission of red corpuscles must be brought about by blood-sucking parasites.

An experiment was therefore carried out with a view of testing the accuracy of this belief. Some score of lice were collected and starved in captivity for three days; a number of them died. Two pairs of the survivors were taken and allowed to bite, under a watch-glass, two patients suffering from "trench fever" in an acute stage. After allowing them to feed for about fifteen minutes their meal was interrupted, and each of us then allowed a pair to feed upon himself, strictly confining their sphere of operations by means of a securely fixed watch-glass. The one of us whose duties did not bring him into the wards subsequently, twenty-four hours later, allowed his pair to have a further meal on himself. Twelve days later characteristic symptoms manifested themselves, and he passed through a most typical attack of the condition of average severity, with the pains and other features all present. It may be further noted that the victim had not at any time been nearer to the Front than the base, nor had he been subject to any previous similar condition.

INTESTINAL OBSTRUCTION DUE TO ASCARIS LUMBRICOIDES.[1]

By J. Maxime Perret, M.D., and H. Theodore Simon, M.D.

Report of a Case.

The authors give references to cases of obstruction where the cause was discovered post-mortem and at operation.

Vickery[2] was called to see a pregnant woman with symptoms of intestinal obstruction and a history of vomiting several roundworms; on being given a dose of sanotin, followed by castor oil, she vomited twelve roundworms. The symptoms of obstruction disappeared, and excepting for the sudden termination of gestation, she made an uneventful recovery.

Takaki[3] reports a case of acute obstruction in a 3-year-old child with complete recovery following the vomiting of 115 roundworms.

Having consulted the records of Charity Hospital in the ten years from 1906 to 1916, we find 112 cases of intestinal obstruction, in ninety adults and twenty-two children, and of these, there is but one case in which the roundworm is the etiologic factor. The patient was a young negro girl who was operated on for obstruction. A portion of the intestine was filled with a mass of worms. The condition necessitated a resection of the intestine, and a Murphy button was used; shortly afterwards, after some apparent improvement, the child died, and necropsy revealed the presence of a roundworm in the lumen of the button, which it occluded.

Report of Case.

History.—M. M., white girl, aged 8, was admitted on the evening of March 14, 1916, having been referred by an attending physician for surgical intervention of what he rightly diagnosed acute intestinal obstruction. The family history was of interest, as the patient's five sisters and brothers had passed roundworms on many occasions. The past history was negative, except that the child had frequently passed roundworms since the age of 2.

Five days prior to admission the child was suddenly taken ill with a pain in the right lower abdominal quadrant, and slight elevation of temperature. On the second day she began to vomit, and this continued up to the time of admission. The vomitus consisted of a clear watery fluid. A dose of castor oil was given the second day and only a very small stool passed, with no more bowel movement until she came under our observation.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, January 27, 1917.

[2] S. Vickery, D. H.: "Intestinal Obstruction Due to a Coil of Worms," *Brit. Med. Journ.*, 1913, 2, p. 1534

[3] Takaki, Y.: "Sci-I Kwai," June, 1915.

Temperature, Pulse and Respiration.

Time	Temperature	Pulse	Respiration
On admission	101	120	25
Four hours later ...	103	112	30
Eight hours later ...	102·4	116	26
Twelve hours later ...	99·6	100	24

Physical Examination.—The child was poorly developed and nourished. The skin was of a slight sallow tint. The glands in neck and groin were enlarged. The eyes were sunken, with dark hollows under the orbits. The teeth were badly kept. The tongue was dry and coated. The throat, nose, ears and heart were negative. Coarse mucous râles were heard over the lower half of the right lung, both anteriorly and posteriorly. The abdomen was distended and tympanitic; there was no rigidity. In the left lower abdomen, in the region of the sigmoid, a mass the size of a large lemon was palpated. The viscera were not palpable. The extremities and reflexes were negative.

Laboratory Reports: There was a total white blood count of 16,800 per c.mm. The differential white count revealed: lymphocytes, 21 per cent.; endothelial leucocytes, 3 per cent.; neutrophiles, 67·5 per cent.; eosinophiles, 8·5 per cent. Examination of the urine revealed: albumin and sugar, negative; indican, strongly positive; microscopically, a few leucocytes.

After the examination a purgative enema was given, and returned coloured with fæcal matter and containing a mass of approximately forty roundworms, coiled and interwoven together, the size of a child's closed fist. A second enema was given and returned highly coloured with fæcal matter. The distension was relieved, and excepting for a rise in temperature the first eight hours, the patient's condition improved, and in twelve hours the temperature was but 99·6° F. The patient continued to improve, and excepting for an acute bronchitis, which she developed on about the seventh day, made an uneventful recovery, and was discharged as cured, April 2, 1916.

Summary and Conclusions.

We find that, although the disease is rare, there are quite a few cases of intestinal obstruction due to roundworm.

Most cases are diagnosed at necropsy or on the operating table, and only seldom is the mass of worms expelled through the natural channels.

Although the most drastic purgatives may be of no avail, the enema may in a few cases cause the surgeon to lay aside his knife.

Notes and News.

SCIENCE AND BOVRIL.

At the twentieth annual general meeting of Bovril, Ltd., Sir James Crichton-Browne said that one truth brought home to us by the War was that this country suffered from its neglect of science in the past, both in its industrial and commercial undertakings; and it reflected great credit on the perspicacity and foresight of the founders of Bovril that they had linked it up with science from the very first. They set up a chemical department in their factory to supervise all raw materials, and to maintain the constant standardization of its products. They had also introduced a certain scientific element on the Board. When the history of the War came to be written it would be admitted that Bovril had "done its bit." It had sustained the vigour and pluck of our men in the fighting line. It had supported and built up again the maimed, and the sick and wounded; and it had braced up and comforted the workers, the watchers, and the mourners at home.

The War has stirred feelings of patriotism throughout the land; we have come to dislike and distrust anything that is of German origin—anything that has emanated from that breeding ground of lies, treachery, piracy, murder and calculated brutality, and it is imperative upon us all to patronize British commodities. Bovril is of British origin, and always has been British to the core.

Drugs and Appliances.

PARKE, DAVIS AND CO.

The February, 1917, edition of *Therapeutic Notes* contains an account of a case of arthritis deformans treated with "Rheumatism Phylacogen" which afforded primarily relief and subsequent cure of the ailment.

As a means of combating nausea in pregnancy, the intramuscular injection of corpus luteum extract has attained a reputation for success.

Parke, Davis and Co. have recently introduced Corpora Lutea Soluble Extract, which is supplied in ampoules of 1 c.c. (six ampoules in a box). Each cubic centimetre represents 20 cg. (3 gr.) of desiccated corpora lutea, the vehicle being physiological saline solution saturated with chloretone for preservative purposes. The Soluble Extract offers several advantages over the desiccated product. The dose is small, and it has produced prompt and often very remarkable results in cases in which the desiccated corpora lutea administered by mouth had failed.

The use of this preparation is suggested by the fact that normally the nausea of pregnancy begins to diminish when the corpus luteum reaches its acme of development.

Original Communication.

THE DISPOSAL OF TOWN REFUSE.

By J. Tertius Clarke.
Health Officer, Kinta, Perak, F.M.S.

In the *Sanitary Record and Municipal Engineering Journal* there is frequent discussion on the disposal of town refuse. Many of the correspondents are municipal engineers, and, possibly because of their professional training, the methods that they advocate tend uniformly towards incineration or to some form of mechanical expedient.

Mr. Burr, Chief Sanitary Inspector, Perak, under the *nom de plume* of "Sanitary Officer," in the number for August, 1913, described how town refuse was treated in Ipoh, and was bold enough to disagree with the prevailing idea that burning is the only ideal method of disposal. He came to the conclusion that the burial of town refuse can be accomplished without harm arising therefrom. With his conclusions I agree on the whole, and I propose to consider briefly the general conditions, and then the practical precautions to be observed in burying town refuse.

Books on sanitation, even the most modern, are very hesitating and vague in the matter, pointing out the danger that arises from flies when town refuse is collected and dumped in one place. They emphasize the dangers that arise after burial owing to slow decomposition, and to the risk that the gases given off during this process may penetrate the earth for long distances horizontally, but they omit to point out how these dangers can be surmounted, and do not, in my opinion, lay sufficient emphasis on the disadvantages of incineration as usually practised. There is nothing very unusual in finding rotting town refuse in the vicinity of an incinerator, and this brings danger from flies equally with the foregoing method. Tins and broken bottles are often left about, and these may be the breeding-places for mosquitoes or, if dirty, of flies.

Imperfect incineration is not the remedy for imperfect burial; the remedy, I submit, is perfect burial.

Conditions in the Tropics differ from those in England in degree rather than in kind. The outstanding differences are that in the Tropics decomposition is more rapid, and the spread of disease through mosquitoes makes the drainage or filling in of swamps a matter of first-rate importance. The conditions that I have in view are those that prevail in general in the Federated Malay States in the average Sanitary Board area.

I would lay it down at once that town refuse must be removed as quickly as possible in order to avoid any risk to the public health, that its disposal must be perfect, and that cost ought only to be considered after these primary essentials have been reasonably well secured; but that it should be made to serve some useful purpose if possible.

Both the initial and ultimate disposal must be accomplished by manual labour, aided by wheeled transport; and I am convinced that if the day's task of carters and labourers is not only carefully laid out but efficiently supervised, it will be found that in most cases the expense consists mainly of the cost of the collection, the filling into the carts, and the labour of the ultimate disposal, and that the cost of mileage is not the controlling factor unless it is very big. Town refuse must be completely disposed of; it must not merely be dumped on to tips, a method which has done so much to discredit its disposal on land. If it can be used for the purpose of raising low-lying land or for filling in swamps it seems probable that, although there may be a slightly increased cost over that of other methods, the reduction in the expense of filling in the low-lying land or swamp may in reality be a saving.

Books on hygiene in general deprecate the use of town refuse for such a purpose. I believe that this is because the work has too often been done in the past in a haphazard way, without any plan or without adequate supervision of a plan once adopted; and that in general the authors of the standard text-books have not distinguished sufficiently between the mere act of dumping refuse on to the surface of the land and giving it a decent burial.

"Tropical Hygiene," by Sir Pardy Lukis and Major Blackham for Anglo-Indians and Indians, may be cited as an example of the prevailing views as to the disposal of town refuse in the Tropics. Three methods of disposal are given:—

(i) By filling in swamps.
(ii) By contracting for removal.
(iii) By burning in an incinerator.

The last is considered to be the correct method; the others are condemned.

While I am not prepared to argue that the method of burial is feasible in every case, it may, I think, be maintained that this method is the most reasonable, practical and efficient way of disposal, whenever suitable land is available within a reasonable distance, if careful supervision is exercised.

The question is usually one of cost in each instance. But I would point out that no community, however poor, can afford to be without efficient disposal, and that if disposal into swampy places can be made efficient, the cost is partly recouped by the benefit accruing from filling in the swamp; and from practical experience I know that very considerable areas of swampy ground can be raised by the use of town refuse. In the case of an incinerator there is not the possibility of recovering even part of the cost. *Per contra* not only the initial installation of the incinerator but its cost of maintenance is high, and there is the extra cost of carting away the residue. Incinerators in general are unsightly, and frequently produce a smoke and other nuisance. Tins and bottles must be separated, and are usually piled up near the incinerator and become the breeding-place of flies, and in the Tropics of mosquitoes. Street refuse has to be separated and applied to land, this entailing more labour, and often as much nuisance as does other town refuse. There seems to be a *prima facie* case against the installation of an incinerator if the methods of burial can be made efficient.

I believe that the objections raised to the burying of town refuse arise because it is not done properly; local authorities are apt to think that if the stuff is removed from the lanes and streets enough has been done, and often very little attention is given to the ultimate disposal which frequently consists in dumping on to a piece of waste land which results in an abominable nuisance.

The varying percentage of organic matter existing in town refuse owing to the presence of offal and garbage renders the case essentially similar to that of the disposal of night soil; that is to say, the layer must not be too thick, and must be adequately covered in order to prevent it from attracting flies.

From my own experience, I would say that for covering night soil the layer of earth should be twice the thickness of the layer of night soil, for covering town refuse the layer of earth should be about one quarter the thickness of the layer of the refuse. The maximum depth of a layer of town refuse should never exceed 3 ft. If town refuse is buried in too thick a layer or too deeply resolution is slow, and gases may be evolved for years. I think it probable that the gases mentioned by Simpson as travelling for considerable distances from the site of burial point to too thick a layer having been deposited in that particular place.

Sand is a bad cover for town refuse, and lime is only an attempt tó disguise what should not be allowed. It is not unusual to see the face of the layer of town refuse uncovered and exposed and a little lime thrown on. This should not be allowed; the face should always be covered with a layer of earth.

There is an idea that the advancing face need not be covered with earth because it is covered by the following day's deposit of town refuse. If this face is not covered there is certain to be an offensive smell and swarms of flies, either of which may travel a considerable distance.

If there is great difficulty in obtaining earth sand may be more economical, but it is better in every case to use earth before putting on the sand in order to obtain the organisms necessary for resolution.

It ought to be possible to get rid of refuse without spoiling land, and in many cases it actually improves the land. This is specially the case with swamps; and here additional precautions are needed. Mere tipping into a swamp is certain to result in a nuisance. Work should be begun in the dry weather, and if necessary a small bund should be made in order to keep out the water from the portion undergoing reclamation; and very great care must be exercised in covering the advancing face of the refuse.

By filling in a swamp with a layer of not more than 2 ft thick and 1 ft. of earth over it, the level of the whole swamp will be more quickly raised than if an attempt is made to fill it in at once to the level of the adjoining land. In the case of very deep swamps it may be found advisable to raise the level first by means of sand or earth, and complete the filling with town refuse in the manner described. In some cases it may be possible to lower the water level by drainage.

When the level of the whole area of the swamp has been raised in this manner, it can be left until such time as bore pits left open for a few days show that there is no offence and that flies are not attracted. This will take from six months to a year, and the level can then be raised by another 3 ft. and so on until the level of the surrounding ground is reached. In many cases it will be found that the upper layer of this ground can be used for covering the second layer of refuse.

Swampy land is of no value, but when raised may be of use for agricultural purposes. If the town extends up to its edge it should be kept as open space. It should not be used for building purposes until analysis of each layer shows no excess of organic matter over the amount found at similar depths in the surrounding land. But I would add that as this land was, when first filled, valueless, a nuisance, and dangerous to health, there is no reason why it should not be kept as open space in perpetuity. If the owner originally was not willing to spend money on the land, there is no reason why he should benefit by the enhanced value which attaches to it by reason of its having been raised and by reason of the extension of the town. Many an owner does not object to swamp on his land being a danger to those in the neighbourhood, but is very glad to pocket the unearned increment which the energy of these same people has given to the value of his property.

To return to the question of expense. This method of disposal is no more expensive than any other efficient method until mileage becomes great, but the mileage need not become excessive for most towns, as there is no necessity to limit direction; the refuse of one part of the town can be taken to the swamp nearest to that part, and a great saving takes place by reason of not having to separate such incombustible things as tins, bottles, or street sweepings.

The time may arrive in any town when its growth may render the cost of cartage prohibitive and incineration necessary; but even then the refuse from the outskirts could be disposed of by burial. Until that time arrives I believe that the method I have described will be found to be the best for most places in the Tropics.

It is, of course, imperative that the refuse shall be removed as early as possible and that the burial shall be complete, and for this there must be careful supervision. Failure to cover the advancing face will result in nuisance, and it is this face that requires the most supervision. In addition to careful supervision it is necessary that a clear and accurate record be kept of the work done, so that no advantage shall be taken of the change of officials to use the land for building purposes.

In this paper I am not endeavouring to show that incinerators are of no value; incinerators have their place, nor have I gone into the question of manurial values, which are probably great but counteracted by the heavy cost of carriage. I am merely trying to show that the cost of removal of town refuse may be recouped to a certain extent by the gains incidental to the filling in of low-lying land; while the method of incineration gives back nothing in return.

In conclusion, I maintain that, though conditions differ widely, the method I have described is very generally applicable.

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Syphilis after Two Years of War (Gaucher and Bizard, *Bulletin de l'Académie de Médecine*, December 19).—Before the War, in a series of 3,000 patients, 10 per cent. were syphilitic. In the first sixteen months of the War this proportion had increased to 16⅔ per cent., and in the last eight months to 25 per cent of 2,300 patients. This last series of 600 syphilitics includes 219 civilians, thirty-seven under 20 years of age, and fourteen between 50 and 59, with one each of 64 and 66. Among the soldiers those over 25 furnish the largest contingent. Among 222 women with recent syphilis during the first eight months of 1916, more than two-thirds were married, and in a large proportion of cases the first symptoms were noted soon after the husband's brief visit home. A third of these women were over 30 years old, further testimony to the probability of infection having occurred under legitimate conditions.

Gaucher emphasizes also the extraordinary prevalence of gonorrhœa in both men and women, and expatiates on the necessity for enlightening the public as to its dangers, and, last but not least, on the necessity for teaching physicians to diagnose and treat it properly. He has been appalled at the ignorance of the dangers of venereal disease which has been revealed by inquiry among the young men examined. A number of instances are cited showing further that syphilitic eruptions and other lesions in both men and women had long been given futile treatment on a mistaken basis, throat lesions, leg ulcers, alopecia, which subsided at once under specific measures. The negative statements of patients should never be heeded. He insists that every physician should take a course of training in some service for syphilography, especially now that there is reason to fear that syphilis is going to be carried into the remotest villages. He pleaded with the authorities a dozen years ago to have a course in skin diseases and syphilis included in the fourth year of the medical course. All agreed with him as to its advisability, but nothing was done, he remarks, "as it is the custom in France to take no steps to prevent evil, and to wait until it is done before seeking to remedy it." He adds that the War alone is not responsible for this increase in syphilis; it has only precipitated it."

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AGE AS A FACTOR IN DISEASE.

Has the blood of old persons a prophylactic value? That old people are well-nigh immune from certain infectious ailments is an everyday observation which, like many others, is received as an axiom and accepted without discussion as a truth. That it would bear analysis and looking into scientifically with profit seems never to have been thought of by physiologists, or, at any rate, we are unaware of the fact. Old age has been dealt with by many, but it is the pathological conditions, the clinical features of organic degeneracy, and "old as his arteries" sides of the question that are alone noted and set forth. And yet again, at the other extreme of life, the infant or first-year stage of life, there seems to be an immunity more or less recognized and accepted as a fact without further comment. Perhaps there is nothing to learn by a study of the causes for these immunities, but it does seem true that the very young and the aged are immune from many of the ailments which afflict youth and middle age.

The infant under 12 months seems less prone to infection that the older members of the family, and especially, may it be said, the breast-fed infant. How often does it happen that the baby is the only one of some four or five children who escaped when measles, scaret fever, mumps, whooping-cough or other diseases of childhood prevailed? Not that the infant is protected by any precautionary measures; the house is small, the rooms few, segregation is impossible, for the mother has to attend to all the children, and between intervals of attending to the fevered children she breast-feeds the baby. If there is truth in clothing, in personal contact conveying diseases, then is the infant exposed indeed, for the infant has to be fed and carried about by the mother, and in the majority of families actually sleeps alongside of the mother.

The cause of this immunity may be far to seek, and cannot be dealt with offhand, nor settled by pen and paper. Is it worth investigating? it may be said. *Qui bono?* Accept it as a fact and let it alone. A certain school, however, claims that there is no immunity; that the fractious infant means an infected infant, and that the fact that the infant cannot express its feelings and sufferings otherwise than by fractiousness is the explanation of the seeming immunity. To some extent this may be true, but it is not so in the majority of instances. Often does it happen that an epidemic of measles in a village attacks all children non-immunized by a previous outbreak except the infants, and then a few years later, when these infants have attained an age between, say, 3 and 8 years, they are the only children attacked, showing that the "fractious" infants did not have the disease, as they were now the only sufferers in the families attacked, the older having been rendered immune during the previous epidemic.

Take, again, such an ailment as rheumatism, that most indefinite of all ailments whether in the old or young. Leaving aside the questions of "rheumatism," "rheumatic gout," "rheumatic thickenings and nodules," "fibrositis," and the host of legendary titles and terms under which in our ignorance we find a cloak when speaking of rheumatism, take something said to be a very different thing, "rheumatic fever." Is it different? Some believe it is part and parcel of an infection which produces in children nodules, "growing pains," chorea, tonsillitis, "sore throats," skin eruptions, not to speak of valvular affections of the heart, adenoids, and their attendant mouth, nose and chest lesions and deformities?

Yet with all this list of ailments, which is long enough and comprehensive enough to explain almost any affection to which childhood is heir, it is a fact that children under 5 years of age are much less liable to "rheumatism" than between 5 and 10, and that the immunity of infants is well-nigh complete.

Rheumatism may be parasitic in its origin, and its organism may be ultra-microscopic, but like many other ailments the disease with care would never have developed had the child been cared for as the infant is. It is only after exposure to damp feet, clothes and dwellings when the child goes to school, that the "germ" or factor of rheumatism seems to develop. But whether developed within the body of the child itself or contracted by infection from other children in consequence of lessened power of resistance owing to the effects of exposure, may be a matter of moment and extreme importance from an epidemiological point of view, it is from the point of the study of mere age as regards infection immaterial. Suffice it to say that, one factor in the influence of age, at any rate, as evidenced by rheumatic experiences, is one of care, clothing, feeding, and general hygiene.

Heredity.—In even such a disease as rheumatism, however, heredity plays a part, and it may be a great one in the consideration of liability; so that we are again thrown back upon what, unfortunately, must be called theory, after having apparently shown that external influences were *the* cause of the ailment.

Can a child, then, generate rheumatism—*sui generis?* To all appearance it would appear so. Neither father nor mother, nor any other member of the family may ever have had so-called rheumatism. One child only is seized. Was that due to mere exposure, or was the exposure but the channel by which the poison gained entrance by infection from others?

It is well known that acute rheumatism is practically unknown in the Tropics. Muscular rheumatism there is, but rheumatic fever is not met with. Why should the "rheumatism" of the Tropics never develop into "rheumatic fever," when the rheumatisms, tonsillitis, chorea and growing pains in temperate climates seem to be the evidence of an infection which culminates later in "rheumatic fever"? It would seem after all that the later is a specific ailment, and not a mere feature in a "chain" of less indefinite ailments.

But measles, scarlet fever, and other ailments are due, as we believe, to a direct infection from other cases. They need not, nor are they, preceded by any form of preliminary signs, symptoms, or bodily conditions we know of. Yet why do they miss the very young as a rule? The infant at the breast remains in perfectly good health whilst the others suffer, and only gets the diseases when it reaches a "suitable" age for its acquisition? What was there or was there not within the infant to account for its immunity? If it is true we are born with a certain amount of food in our blood which can afford support to the germs of measles, scarlet fever, &c., why did not the infant of the family get the disease whilst it prevailed in the family? Was it because there was no "measles germ food" in the blood that it escaped, and if not, when was that particular "measles food" developed? In other words, what was there in the blood to protect the infant from infection that was withdrawn after, say, twelve months of life? One can speculate, of course, on the subject in many ways. Had the development of organs, the growth of some and the disappearance of others, anything to do with it? There are such phases in our organs. The pancreas does not commence its functional activities until almost the seventh month of life, and the thymus gland begins to wane in its bulk from about 5 years of age onwards. The genital organs are passive, as regards their procreative powers at any rate, until early youth, and at this period tendencies to the diseases of childhood diminish; but rheumatic fever now claims ascendancy over the "rheumatic" ailments mentioned in the category given above. Pulmonary phthisis in a late manifestation of tuberculosis, the earlier stages of the infection being diseases of bones joints, glands, intestine, &c.

Turning now to persons of maturer years, we have to view the comparative freedom of middle age, and especially old age, from many ailments of the infant, child, youth, and full maturity. The cause no doubt may be due to natural immunity, due to having had the ordinary epidemic diseases in early life, but some diseases cannot be so explained. Typhoid fever is rare amongst older people; diphtheria is in the same category, and so are rheumatic fever, dysentery, yellow fever, typhus, and even plague. During an epidemic liability to infection diminishes from adult years, as middle life approaches, and to a still further degree as old age is attained. The explanation cannot be answered at present. Theories can be advanced, of course, in plenty. The atony of the lymphatic system with growing age is a favourite line of argument; but is there an atony of the lymphatic system during advancing years, and, if so, what effect has that upon the condition of the blood?

The value of such an inquiry may be of mere academic interest; on the other hand, it may be of some therapeutic value. If the blood of old people possesses powers antagonistic to certain germ infections, can it not be used either on account of its prophylactic values, or its curative powers upon the young? It seems, perhaps, a far-fetched suggestion, but many improbable theories when tested have proved of incontestable value.

J. C.

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Annotations.

Hæmorrhagic Affections in the Italian Troops (Siccardi, *Gazzetta degli Ospedale*, December 17).—Last summer a transient hæmorrhagic diathesis was epidemic among the troops serving at the highest altitude among the mountains. Whatever affection the men had, a hæmorrhagic character was strikingly evident. Hæmorrhagic scurvy formed 2·5 per cent. of the cases, and a "hæmorrhagic parascurvy," as he calls it, formed 42 per cent. The symptoms were the same as in true scurvy, but the general health was not impaired, and in 29 per cent. there was no stomatitis. In 51 per cent. of the cases there was typical exanthematous purpura. The course in all the cases was benign. Rest and dieting seemed to be all that was necessary. Defective ventilation of the underground shelters, the cold and damp, wet feet, wet clothes, and the unbalanced diet easily explain the tendency to these troubles. Rest, dry warmth and change of diet soon restored normal conditions as a rule. Bacteriologic tests were constantly negative except in a small group of 0·5 per cent. who presented infectious hæmorrhagic skin lesions with typhoid plus *Paratyphoid B.* in some cases. Of the total number of men with this hæmorrhagic tendency, 4 per cent. were in the frozen limb group, weak, but with no signs of sepsis.

Stab Wound of the Chest and Diaphragm; Thoracotomy; Laparotomy; Packing of Punctured Spleen; Recovery.—Dr. Bulkley (New York Academy of Medicine, Section of Surgery, November 3, 1916) reported the case of a boy, 14 years of age, who was admitted to the hospital October 26, 1916. One half hour before admission he was stabbed in the left lower chest with a banana knife. Through this wound, ½ in. in length, there protruded a small bit of dirty omentum. There were no signs at this time of intra-abdominal injury. The wound was enlarged and a bit of the ninth rib was resected, and it was then found that the knife had penetrated the pleural cavity without injury to the lung and had inflicted a wound in the diaphragm through which the omentum prolapsed. The omentum was amputated and the stump reduced; the rent in the diaphragm was closed without difficulty. Twelve hours later there were distinct evidences of peritoneal irritation with signs of hæmorrhage and free fluid in the left gutter. A left split rectus incision was made, and later enlarged by a free incision along the left costal margin. The left gutter and pelvis were filled with blood. On the diaphragmatic surface of the spleen was a punctured wound nearly 1 in. in length, still actively bleeding. Having lost a case of ruptured spleen recently, and in view of the poor condition of the child, a splenectomy was not attempted, but a large gauze strip was packed between the diaphragm and spleen, and the wound rapidly closed after flushing the abdomen with saline solution. The drainage tube in the chest was removed in thirty-six hours, the abdominal packing in forty-eight hours, and both wounds healed practically *per primam*. The patient was now well and without symptoms. This case was shown as an argument against the teaching that all injured spleens should be removed. At the same time during which the patient was in the ward a case of stab wound of the spleen in an adult male was admitted seven days after post-operative, transferred for morphinism. This patient had also simply been packed, and he, too, recovered.

All such cases did not call for decortication of the lung. Instead of rib resections they were now having recourse to a rib-spreading device, by means of which one was enabled to see everything in the chest. One could perform a rib resection much more easily by using the intercostal incision and the rib-separating device.

It was a question in the case of injury to the spleen whether one should take out the spleen or pack, but it seemed that one could get very good results by packing.

The case was cited of a child that had been run over by an automobile. This child had a tear in the dome of the liver which required laparotomy, and a hæmorrhagic effusion into the right pleural cavity. The effusion was treated by aspiration twice, and the child made a perfect recovery.

In case of injury of the spleen or liver through the thorax by shot, stab, &c., with immediate severe hæmorrhage, a trans-thoracic laparotomy was advised. By the use of rib-spreading one could do the work almost as easily as by way of the abdominal cavity. One could nicely reach the spleen and convexity of the liver or extirpate the spleen by this route. If conservative surgery was indicated, one must of course close the chest and then make an abdominal incision. If there was effusion into the chest one did well to leave a hæmorrhagic effusion alone, but if there was blood plus air it made a great difference in the treatment. In the latter case siphon drainage should be used.

The surgery of the chest was not in any way different from that of the abdomen if one used the rib separator whereby a free insight and manipulation was afforded.

A young boy had a quarter of the spleen torn completely off, and there was free hæmorrhage through the vasa brevia. The smaller portion of the spleen was excised, several veins and arteries in the gastrosplenic omentum tied, and a gauze packing fastened to the spleen with a mattress suture of fine catgut. At the end of three days it was possible to withdraw the packing, and the wound closed rapidly without trouble. Whereas splenectomy in adults could be performed without apparent harm, in the case of young children it was reasonable to suppose they would be better off if as much of the spleen as possible were left in its place.

In another case he had operated on was a man who had been shot through the tenth rib on the left side. The bullet punctured the pleura, but there had also been an injury to the kidney, as the urine was filled with blood and the abdominal cavity showed free fluid. Laparotomy through the left rectus found the kidney torn by the bullet and the spleen lacerated by a fragment of rib. Nephrectomy was performed, but it would have been too much for the patient also to remove the spleen, so the wound in the spleen was packed. The man made a good recovery. He was a prize fighter, and had since been in the ring.

Drugs and Appliances.

PERRIER WATER.

Results of repeated analyses in France show that Perrier water can stand the most exacting ordeal required by chemical and bacteriological investigation in regard to questions of purity. Since the water was placed upon the English market in 1904 to the present time, it has been systematically and periodically examined. The many results obtained show no appreciable deviation from the first figures, and recent analyses confirm this work in all significant particulars. It possesses no objectionable mineral salts, is organically pure, and is perfectly free from harmful bacterial life. The samples obtained upon the market were, in fact, sterile. Such findings afford a strong recommendation in regard to any potable water, and in a water pleasantly aerated with the natural carbonic acid gas of the springs the result is particularly satisfactory. The care taken to preserve the water in its pure state on its way from the springs to the consumer has clearly been complete. The advantages of natural carbonic acid gas in table waters are still a matter of controversy, some maintaining that the chemically prepared gas is less easily assimilable. There is one important difference which is noticeable when natural gas is used, and that is, it gives a softer and pleasanter taste to the water and renders it more palatable and digestible. For some reason artificial gas gives a sharper, less pleasant taste to table water than does the natural gas, and this may well prove to be a dietetic disadvantage. Some medical men in France attach great importance to the use of natural gas for aeration purposes and attribute to it a more favourable action on the gastric processes, but it is generally agreed that the moderate use of aerated beverages promotes digestion and stimulates the motor activity of the stomach. There is evidence that they help digestion also by a mechanical process, the bubbling up of the gas through the stomach contents facilitating their disintegration. The natural effervescing waters appear also to influence osmotic processes to a greater degree than artificial mineral waters, and thus increase the powers of absorption and promote diuretic action. It is also an advantage to know that Perrier water can be found in bottles of suitable sizes both in France and England, as well as in their Colonies and Dependencies.

Abstracts.

THE OPERATIVE TREATMENT OF CRYPTORCHIDISM.[1]

By Edward L. Keyes and David W. MacKenzie.

The object of this communication is not to discuss the propriety of attempting to place the retained testicle in its proper place in the scrotum, but simply to describe in detail the method we employ to achieve this result. The operation is essentially that described by Bevan, but we feel that many of its details have never been thoroughly discussed, and it is our purpose to describe these. Such a description appears particularly opportune, since we are convinced that practically every testicle can be placed in the scrotum if the operation is carefully performed. Several recent publications describing series of cases of which as many as 30 per cent. have resulted in leaving the testicle within the abdominal cavity seem to call for some such detailed description.

Let us preface our description with a few statements that appear to us axiomatic, and on which we justify the employment of an operation.

(1) The testicle retained within the abdomen is doubtless much more liable to teratomatous change than the normally situated testicle. The testicle retained in the inguinal region perhaps shows a similar though lesser liability to malignant disease.

(2) Yet we find no evidence that the testicle which has been placed in the scrotum by operation is unusually subject to teratoma.

(3) The retained testicle has often lost its spermatogenetic function either by congenital deformity and obliteration of the epididymal tube, or by atrophy. Atrophy is not likely to occur before puberty in an organ otherwise normal and with normal epididymis only.

Hence there is every reason to operate at about the time of puberty in order to forestall atrophy. If the operation discloses grave deformity and separation of the epididymis from the testicle, the occlusion of the duct may be taken for granted. Yet this is no reason for not proceeding with the operation, since the testicle is doubtless safer from teratomatous malignant change and is certainly more decorative when in the bottom of the scrotum.

Almost every retained testicle is associated with either clinical hernia or with a pouching of the peritoneum, which predisposes the patient to hernia. The operation thus indicated for the cure of hernia is somewhat prolonged, but not gravely complicated by the effort to replace the testicle in the bottom of the scrotum.

The safety of the operation is attested not only by our own series of thirty-three operations with no deaths, but also by similar statistics from other authorities.

Unless operation is called for by grave hernia at an early age it is safer not to attempt the procedure much before puberty, for the vessels are so small and delicate that they are likely to be torn unless the operator is unusually expert.

Technique of the Operation.

The skin incision is made as for inguinal hernia, extending obliquely from a point over the internal abdominal ring to a point about 1 in. below the external abdominal ring, the incision lying parallel to and about a finger's breadth above Poupart's ligament.

As in the operation for hernia the dissection is carried down to the external oblique aponeurosis, which is then split, thus opening the inguinal canal. Until this step has been made no attention is paid to the testicle, for any effort to free this is likely to result in mixing the operator up in a mass of adhesions.

The inguinal canal having been opened, the cremasteric fibres lying over the contents of the canal (cord, testicle, hernia) are picked up and divided between two thumb forceps.

Working within the fascial layer inside of the cremaster, the contents of the cord are then separated and delivered as in the operation for hernia.

The hernial sac is now sought for, in the upper part of the canal, if necessary, opened and separated by blunt dissection from the spermatic cord.

The testicle is now freed from the gubernaculum and other attachments below it, leaving it attached to the patient only by the spermatic cord.

Now comes the delicate part of the operation, the lengthening of the vas and vessels. In a minority of cases this can most readily be done by treating the spermatic cord as if one were about to operate for varicocele or for division of the vas. First, the muscular and fascial compartment in which the pampiniform plexus lies is incised longitudinally and the veins picked out. Then the smaller compartment, in which lies the vas with its vessels, is similarly opened and the vas picked out. The spermatic cord is now represented by three separate bundles, the pampiniform plexus, the vas and its vessels, and the musculofascial envelope. This last is divided and its ends carefully stripped back over the vessels and vas, the exuberant tissue being cut away. This dissection is carried with especial care up toward the abdominal cavity until the point is reached at which the vas distinctly separates in its intra-abdominal course from the pampiniform plexus. It will now usually be found that there is ample length of spermatic cord to permit the testicle to descend well into the bottom of the scrotum without any tension whatsoever.

Certain exceptions may be noted, however, as follows:—

(1) The younger the patient and the smaller the testicle, the less developed is the cord likely to be and the more intertwined with muscular and fascial

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, February 3, 1917.

fibres, so that in such cases (and they constitute the majority) it is impossible to make a clean separation of the vascular elements from the fascial capsule without tearing many and perhaps all of the vessels. It will be found in such cases that fascial separation by snipping may be made here and there along the vessels, and that a great deal of slack may be obtained by separation within the abdomen.

(2) If the testicle is originally found near the internal ring or within the abdomen, it is usually necessary to divide the pampiniform plexus, although atrophy will doubtless result from this, in order to bring the testicle down to the bottom of the scrotum.

(3) If the testicle is at or near the external abdominal ring the slack obtained in the veins is usually greater than that obtained in the vas, so that there is no reason to divide the pampiniform plexus.

(4) If, in spite of a deep dissection within the pelvis, the vas remains too short, about 1 cm. may be gained by displacing it to the inner side of the internal epigastric vessels. It has been suggested that the vessels be cut for this purpose, but we have found it perfectly feasible to perforate the fascia to the inner side of the internal epigastric vessels without cutting them, and to slip the testicle through the opening thus made. As far as we are aware no direct hernia has resulted from this procedure.

(5) Retention of the arterial supply is of utmost importance, and it will sometimes be found that the artery of the vas short circuits, as it were, a loop of the vas itself, so that in order to save the vessel we must omit the unfolding of this loop.

(6) In four cases all of the vascular supply of the testicle was apparently destroyed, only the vas remaining to connect it with the body. Yet in only one of these cases did sloughing result. The others were considerably atrophied already, and there is no evidence that they atrophied any further.

The cord having thus been lengthened, the tunica vaginalis, which has doubtless already been opened, is inverted as for the operation of hydrocele.

With two fingers the scrotum is opened down to its very base for the purpose of receiving the testicle. The dissection of the scrotum must be carried rather toward the perineum so as to get to the bottom of the sac and deeply enough so as to open the fascia right to the skin.

The scrotum is now inverted on a finger so that it is turned inside out and brought up into the inguinal incision. With a straight needle and a fine suture of chromic gut the testicle itself is then sutured to the bottom of the scrotum. Two precautions are here necessary. In the first place the suture must be placed in the testicle itself, for if the surrounding fascia is sutured there is so much laxity that the testicle may not be drawn down into the scrotum. It is obviously improper to suture the epididymis to the scrotum for fear of obstructing the excretory duct, whereas a suture in the testicle itself does no harm. The second precaution is to avoid very carefully any torsion of the testicle.

With the finger withdrawn, the testicle enters the scrotum and is pulled down into place. There it should lie without any tension whatsoever at least well below the pubic bone, preferably so low as to be opposite its fellow. If the testicle does not lie spontaneously in good position, it is our belief that no amount of suturing about the neck of the sack or suturing the testicle itself to the thigh will better the situation.

The wound is now closed in the usual manner, beginning with closure of the hernial sac and then passing to closure of the inguinal canal. It has not been our custom to transplant the cord as in the usual Bassini operation.

It is noteworthy that three patients have come for a second operation, one a personal failure, the other two failures at other hands. Each of the three was reduced with no real difficulty, although the separation of adhesions considerably prolonged the operation. The ultimate result was just as good as that obtained in primary cases.

Results.

Forty-two testicles were operated on, twenty-two right, nineteen left, nine bilateral. All had excellent results excepting one operated on in 1907. He was 9 years of age at the time of operation, and both of his testicles were in the inguinal canal. They were placed in the scrotum and sutured to the thigh, but they broke away and retracted into the inguinal canal again. Eight years later the right one could not be felt, the left one lay near the external ring, and was, by our present method of operating, readily placed in the scrotum, giving a good result. One other patient, aged 16, had an extremely bad result. The right testicle sloughed, the left retracted over the pubes. In one other case the testicle is not in good position, being only just below the pubes and in danger of injury. All of the other testicles operated on are in excellent position; that is, they hang free in the scrotum, although many of them are rather in the upper part of this sac. On the other hand, a few of the testicles operated on are lower in the scrotum than their unoperated fellows.

Before operation three of the testicles lay in the abdomen, thirteen in the inguinal canal, twenty-three at or about the external ring. Hernia was noted in all but eight cases.

During the operation the pampiniform plexus of veins was cut to reduce all of the abdominal testicles, one half of the inguinal ones, and 30 per cent. of those at the external inguinal ring. Most of these operations, however, were performed before we had perfected our present technique. With the present technique we have only once had to cut the vessels of any testicle that lay outside the abdominal cavity. Including even our earliest cases, however, we claim 88 per cent. good results, and no mortality.

A number of cases have been followed several years, and we are fully satisfied that a patient whose testicle is in good position a month after operation is safe from any retraction of that organ into the inguinal canal. We have no observations of any value on the spermatogenetic function in bilateral cases after operation. None of the testicles operated on by us showed, either at the time of operation or subsequently, any evidence of neoplasm.

DIVERTICULUM OF THE URETHRA.[1]

By Simon Englander.

Of the two cases mentioned in this paper, Case 1 probably represents the acquired type, while Case 2 probably represents the congenital type. Cases of diverticula have been described in the bulbous or prostatic urethra, accidentally discovered during a urethroscopic examination for the purpose of discovering the cause of a persistent urethral discharge. There was, as in our case, no stricture or other obstruction present, nor was there any history of trauma, and the writers think that they are due to a defect in the urethral groove.

Case 1.—H. W., aged 30, had a mucopurulent discharge of several years' standing, and wanted to know whether the discharge was infectious. Externally the genitalia presented no abnormality, no tumours, scars, &c., being evident. At about the junction of the membranous and prostatic portion a No. 28 F. sound met some resistance, but was finally passed into the bladder. Cystoscopy revealed bladder capacity good, mucous membrane apparently normal, except at the trigon, where it seemed to be slightly congested. The sphincter was regular. Anterior urethroscopy, except for a very pale mucosa, was also negative. Post-urethroscopy showed a cavity on the right side in the membranous urethra, about 1·5 cm. high by 0·5 cm. in breadth. Catheterizing this opening did not produce any pus.

The diverticulum in this case was due to passage of sounds, was a false passage in fact, made while attempting dilatation of the stricture.

Case 2.—H. L., aged 32, complained of discharge of two years' standing. There were no abnormalities, and no tumour visible or palpable externally. Cystoscopy was negative. Anterior urethroscopy showed a very pale mucous membrane, studded with many inflamed, gaping morgagnian crypts.

Post-urethroscopy with the irrigating urethroscope also shows a chronic fibrous condition of the mucous membrane; the colliculus was small and pale. Just anterior and to the left of the colliculus a small cleft presented itself transversely across the urethra, which on treatment with the syringe could be catheterized to the depth of about $\frac{3}{8}$ in. Its walls seemed rather resilient, as they gave way under the pressure of the irrigating fluid. Its capacity was very small, but could not be determined accurately.

The patient was treated by instillations of silver nitrate up to 5 per cent. into the diverticulum, and also by anterior and posterior dilations, and cauterization of the morgagnian crypts, but with practically no improvement in his condition.

Congenital diverticula present themselves usually as more or less spherical sac-like dilatations of the urethra usually just behind the glans and always on the lower surface of the penis. They are occasionally found at the penoscrotal angle, and may vary greatly in size from that of a pea, or they may take in the whole area from the scrotum to the glans penis. In a case reported, the capacity of the diverticulum was greater than that of the bladder. The orifice of communication with the urethra may be very large, or it may be so small that no urine whatever enters it.

The most plausible and simple theory as to the etiology ascribes the condition to the failure of the distal and proximal end of the urethra to unite at the time when the urine begins to flow out of the bladder. The proximal end of the urethra becomes dilated, and when finally the union is made the dilatation remains as a diverticulum. This theory explains very satisfactorily the frequent occurrence of congenital diverticula in the anterior urethra, and as further proof of this theory is the fact that the diverticula are immediately behind the glans penis.

Von Grigolow believes that diverticula are due to dilatations of accessory periureteral ducts which are themselves due to partial defects of the genital gutter. When these ducts empty at a very acute angle into the urethra, they form valve-like obstructions which are often responsible for considerable difficulty in emptying the diverticulum in post-natal life.

Suter, too, explains the formation of diverticula by some congenital defect in the genital gutter. In reviewing the literature up to 1908 he found only four cases which had been carefully examined histologically and presented a similarity in structure. The lining membrane in these cases presented a papillary connective tissue layer and a stratified epithelial layer, which resembled the structure of the skin to a marked degree. There was no spongiosum present surrounding the sac. Suter's personal case presents a like structure; in fact, so marked was the line of demarcation between the tough white wall of the diverticulum from that of the bluish soft unresisting corpus spongiosum that there was no difficulty in separating the two, and removal of the diverticulum presented no difficulty. He therefore concludes that from a histological standpoint, at least, congenital diverticula are not smple dilatations of the urethral wall but must be looked on as epidermal pockets that communicate with the inferior wall of the urethra. While he concedes that the diverticula are usually in the anterior urethra and often immediately behind the glans penis, he insists that they communicate with the urethra oftentimes at a point a considerable distance behind the glans, and were Kaufman's theory correct, the orifice of the diverticulum should be a very short distance behind the glans.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, February 3, 1917.

Embryologically the defect is thus explained: The urethra takes its origin from the genital furrow which, covered with epidermal epithelium, forces its way into the position which it is to occupy later as the urethral canal. This canal, at first partially open, has at this time a communicating bridge of epithelium with the external surface. The epithelium of the canal becomes cylindric; that of the communicating epithelial bridge remains squamous. Normally the walls of the canal coalesce and become the urethra, and the epithelial bridge is absorbed. It is the persistence of this communicating epithelial bridge that is the cause of diverticular formation or of dermoid.

SYMPTOMS.

The first symptom, which is noticed in infancy, usually is the presence of a tumour and a disturbance in micturition. There is an increased frequency, and as part of the urine is diverted into the sac, a stream lessened both in force and calibre; and as the diverticulum becomes further distended it encroaches more and more on the lumen of the urethra, causing an increased obstruction to the urinary stream. The rapidity with which a diverticulum fills depends on the size of the orifice and to some extent also whether the opening is valve-like, with the free edge of the valve pointing toward the bladder. In most cases, however, the diverticulum empties itself slowly drop by drop, after the urinary act is completed, and does not give rise to a great deal of trouble unless the sac becomes infected. Not infrequently it becomes necessary to empty the sac by manual compression, especially when the opening is very small; or a valve interferes with the emptying of the diverticulum, causing dribbling of urine, and when communicating with the posterior urethra may cause an incontinence. Should infection occur in the sac, the obstructive factors may make themselves much more evident and may become very acute and cause considerable apprehension as to life, or the condition may become chronic and may be the cause of the usual sequel of a long continued urinary obstruction, such as cystitis, hydronephrosis, pyelitis, pyelonephritis, &c. Sudden urinary obstruction due to diverticular formation may follow excesses in drinking or in venery.

Stone formation is very common in diverticula. It is remarkable how many and how large the stones may be and not cause any serious discomfort. In one case diverticula contained 182 stones. In another case of stone in a diverticulum it weighed 125 grm. and measured 6 by 5·5 by 4·5 cm., which to the patient's knowledge had existed since earliest childhood, and up to two years previous (he was now 36) had caused him no trouble whatever. A soft rubber catheter, 20 F., passed by the stone with ease, and except for a little dribbling, for two years past, there was no interference with the urinary stream. It is sometimes of interest to know whether the stone is the causal agent in diverticular formation or vice versa.

A case of persistent gonorrhœa was finally cured by lavage of a diverticulum the size of a hen's egg in the perineum. The patient may first become aware of the diverticulum when, during an acute gonorrhœa which is apparently cured, pus may be expressed at intervals from the urethra and with no reference to the length of time the urine was withheld, or to the time of day, and disappears just as quickly as it came. Occasionally with irrigation under pressure some of the irrigating fluid may be forced into the diverticulum and cause a tumefaction.

DIAGNOSIS.

This is usually easy, for the patients usually come with a characteristic history—that is, the formation of a tumour on the ventral surface of the penis during micturition, which gradually decreases in size after the urinary act is completed. Occasionally the swelling is not noticed until infection, whether gonorrhœal or otherwise, sets in. Another method is to empty the bladder of its urine, and as the catheter is withdrawn and its eye is opposite the opening of the diverticulum, there is a sudden gush of urine as the sac empties itself. Endoscopic examination, especially under water dilation, will often reveal the opening of the diverticulum. A congenital diverticulum, too, will give some history of urinary disturbance, such as dribbling, straining, or even complete obstruction since early infancy or childhood.

The etiology of acquired diverticula is varied and may be due to one of many diverse causes. Dilatations may form on the proximal side of strictures or at the site of post-operative scars. Stagnation of urine may occur, and the weakened unresisting wall may give way and form diverticula.

Injuries to the urethra, whether accidental or operative, as also fistulas, retention cysts, hæmatomas or abscesses which burst into the urethra, may be the cause of the formation of diverticula. In the male, retention cysts of Cowper's ducts or abscess formation of Cowper's glands, or chronic inflammatory conditions of the mucous follicles of the urethra, or the bursting of dermoids into the urethra are the most frequent causes. It is evident, therefore, that acquired diverticula may be situated anywhere in the urethra, contrary to the congenital, which are practically always in the anterior portion of the canal.

Careless instrumentation, followed by more or less urinary infiltration, abscess formation, and finally formation of diverticula, is the sequence of events sometimes experienced by the careless worker in the genito-urinary field.

In the same manner, falling astride the perineum may cause formation of diverticula first by secondary stricture formation and diverticula formation behind it; secondly, by breaking down of a hæmatoma and the rupture of the abscess subsequently formed into the urethra; or thirdly, by leaving at a traumatized area a *locus minoris resistentiæ* and consequent dilatation and diverticular formation. When calculi obstruct the urethra they may be an etiologic factor.

In diverticula formed behind strictures the lining mucosa is always inflamed, often even destroyed, this being due to the hard, friable, almost non-elastic nature of the wall of the urethra behind the stricture. When the diverticulum is due to an abscess formation or following the rupture of a cyst, the lining membrane is either granulation or scar tissue. The mucous membrane of the diverticulum behind a stone is usually smooth and well preserved. In all other respects the acquired resemble the congenital diverticula—that is, in their tendency to stone formation, obstruction to urine, &c.

Treatment.

For congenital diverticula this consists if possible in removal of the sac over a catheter in the urethra and the sewing of the edges into the canal so far as possible to restore its normal calibre. Should there be any congenital obstruction, such as stricture or valves, they must be removed. Treatment by silver nitrate instillation is seldom successful.

In acquired diverticula, the cause, such as stone, must be removed. If the case is a recent one, the removal of the stone will at once cure the condition, while in an older case in which extensive changes have taken place in the wall of the sac, the return to normal will be much slower. Diverticula due to stricture formation are cured by dilatation of the stricture, and owing to the fact that there are marked changes in the wall of the urethra, the restoration of the wall to normal is very slow.

Diverticula due to rupture of dermoid cysts, abscess of Cowper's gland, &c., can, as a rule, easily be cured by excision of the offending sac.

Conclusions.

Congenital diverticula may be due to any one of several causes, and the theory of epithelial rests, the theory of defect in or weakened corpus spongiosum, or the theory of congenital obstruction are in the main correct, the various authors encountering a case or cases that they believe prove their contention.

Diverticula may be the cause of persistent urethral discharge, whether specific or otherwise, and sometimes when infected may become a menace to life, may cause serious urinary obstruction, cystitis, pyelitis, and pyelonephritis.

While diverticula of the urethra are much rarer than bladder diverticula, and can usually be recognized easily, there are some cases in which there is no tumour evident, and only a casual urethroscopic examination or one for a persistent discharge will discover it.

The following cases were reported:—

A patient had been treated for stricture of the anterior urethra. The young man had never had any venereal disease whatever, and had been under the care of an irregular physician for some little time. The interesting part was that his symptoms were those of severe stricture of the urethra to the extent that he was obliged to wear a rubber blanket at night to keep the bed from getting wet. We found the diverticulum about an inch from the meatus. After incising the diverticulum and gradually dilating the urethra up to 28 the symptoms subsided. The man had been a great sufferer mentally, but entirely recovered after a diagnosis had been made and proper treatment instituted.

A man complained of having a stricture, and was in severe pain due to retention of urine. A silver catheter was passed into the bladder with ease and emptied about 800 c.c. of urine, but as the catheter passed through the bulbous portion of the urethra there seemed to be pressure against it. Examination of the scrotum showed a rounded sac about as large as an egg which fluctuated on pressure. On turning the beak of the silver catheter downward it could be passed into this sac in the scrotum, and when pressure was made on the sac it emptied through the catheter about 80 c.c. of cloudy urine. The opening of the diverticulum was just back of the external sphincter muscle.

A patient had a stone in this canal, and when the stone was removed he started passing his urine through it. He came to have the sinus closed up. On opening the sinus a double urethra extended from glans to membranous urethra, which was removed en masse.

A patient, a man about 27 years of age, who came for advice regarding marriage within the next year. He gave a history of gonorrhœa of about two years' standing. He had a hypospadias with an opening about one-fourth of an inch back of the meatus. On examination of the urine the first glass was always cloudy and filled with pus, while the second glass was clear. He gave the history of being treated for about two years and could not notice any change. After irrigation pus could be expelled from the urethra by running the finger along the posterior wall. One day the urethra was enlarged at one particular place, and on pressure expelled about half a dram of pus. It contained gonococci. The patient was sent to the hospital and the diverticulum cut down on and ligated off; the mucous membrane was examined. It was found to correspond with that of the urethra, and gonococci were found in the pus of the diverticulum.

I think that the acquired diverticula are a great deal more frequent than the congenital. For this reason I think it depends on one's conception of what a diverticulum is as to which is the more frequent. Just before I came here we had a case in the dispensary. The man had had an operation for a bulbomembranous stricture. You could with the Wossidlo irrigating cystocope, as well with the Buerger cysto-urethroscope, see a scar in the membranous urethra. The posterior urethra was considerably distorted. Back of the colliculus was an overhanging shelf, and under that a diverticulum. Perhaps some would call that a diverticulum and others would not. We did. Since preparing this paper I have seen five or six of these cases, all of which I think were acquired rather than congenital, because there is a history of something having happened, traumatic or otherwise, and then some of these patients presented other symptoms which strengthened our opinion that etiologically the diverticula were acquired. As to the question of cure of diverticulum, unfortunately I have not had an opportunity to do any operative treatment. My treatment up to the present time has consisted of silver nitrate instillation. I admit I have not had much success.

BRAZILIAN TRYPANOSOMIASIS—CHAGAS'S DISEASE.[1]

In Brazil there occurs a special form of human trypanosome disease, which was described in 1909 by Carlos Chagas. Patients with fever, lymphatic and thyroid enlargements, and other symptoms, but without malarial organisms in the blood, lived in houses which harboured an insect which sucks human blood. Studying this insect more closely, he found that it contained trypanosomes, and by letting it bite monkeys and other vertebrates he could produce a form of trypanosomiasis. In the next place, he found that the blood of infants in the region contained the same trypanosome, and by injecting guinea-pigs with such blood he could produce trypanosomiasis in them. As one of the chief characteristics of the trypanosome thus discovered is sporulation without fertilization—schizogenesis—it accordingly was named *Schizotrypanum cruzi*. The insect in question is known as *Conorhinus megistus*. The cone-nose beetle, another species of the same genus, is widely distributed in the United States, and in some localities it may infest beds and suck human blood.

The human disease caused by the *Schizotrypanum cruzi* is endemic in certain regions of Brazil, and occurs there in various forms. In infants it usually is an acute disease with fever and other general symptoms, enlargement of lymph nodes, of the spleen, the liver and the thyroid, with a kind of myxœdematous condition of the skin, and trypanosomes in the blood. Death may occur with meningo-encephalitic phenomena. After from twenty to thirty days of acute symptoms the fever may fall, the parasites in the blood diminish in number, and the attack pass into a chronic phase. In older persons the disease usually is chronic; progressive enlargement of the thyroid is a marked feature, and there may be cutaneous pigmentation, muscular weakness, irregular heart action, and even cerebral diplegia. While symptoms of hypothyroidism may be quite distinct, typical cretinism with idiocy does not appear to occur in such marked form as in European regions of endemic goitre. The evolution of the trypanosome in the insect host has been traced quite fully, and there seems to be no doubt that in nature the bite of the conorhinus and possibly other insects is the regular mode of transmission of the disease, which, however, may be congenital. In man and other vertebrates the trypanosome first lives in the blood, whence it passes into the tissues, practically no organ being spared, the flagella and undulating membrane being lost, and a rounded form not unlike that of the leishmania assumed. Intercellular and intracellular agglomerations of small rounded bodies are found which, when liberated, may assume the typical trypanosome form. The skeletal muscles seem to be the seat of choice, then the adipose and connective tissue, the heart muscle, lymph nodes, &c. The parasite may multiply in muscle tissue without causing a definite reaction. In man the serous membranes, especially the peritoneum and pericardium, have been found greatly increased in thickness, and the lymph nodes, liver, spleen and heart enlarged. There may be marked parasitic and cellular infiltration; and other changes in the heart muscle and in the brain, especially in the acute form, may be multiple parasitic foci with invasion of the neurocytes. The thyroid is enlarged regularly, with infiltrations and fibrous changes, and, as stated, the effects of disturbed thyroid function are seen in the clinical picture.

Whether morbid conditions associated with goitre, occurring in other parts of the world, are of the same or similar nature as this interesting Brazilian disease we have yet to learn.

THE CONTROL OF STRYCHNINE CONVULSIONS BY INTRASPINOUS INJECTIONS OF MAGNESIUM SULPHATE.

E. C. Cutler and B. H. Alton (*Journ. Exper. Med.*, xxv, No. 1, p. 83) report the treatment of a child, suffering from strychnine poisoning, by means of an intra-spinous injection of magnesium sulphate. A single injection of 0·9 c.c. of 25 per cent. solution was sufficient to control the convulsions until the poison was eliminated. The resulting paresis was slight.

A series of experiments upon cats substantiates the claims for this treatment. The proper dosage is 1 c.c. of a 25 per cent. solution for each 20 lb. of body weight of the patient. With children only half this dose is required. The elimination of strychnia is facilitated by the intravenous administration of salt solution.

A second dose of magnesium sulphate may be given, but all precautions should be taken to guard against respiratory depression.

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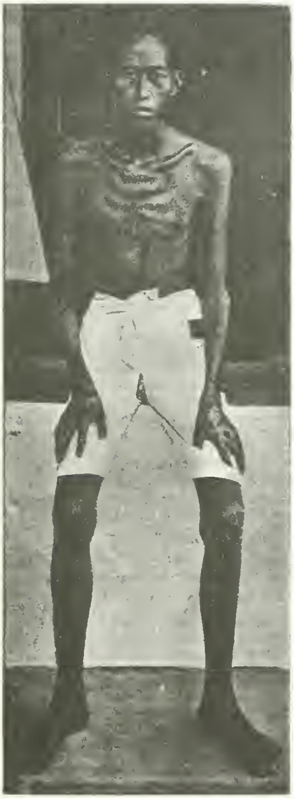
[1] Abstracted from *Journ. Amer. Med. Assoc.*, February 17, 1917.

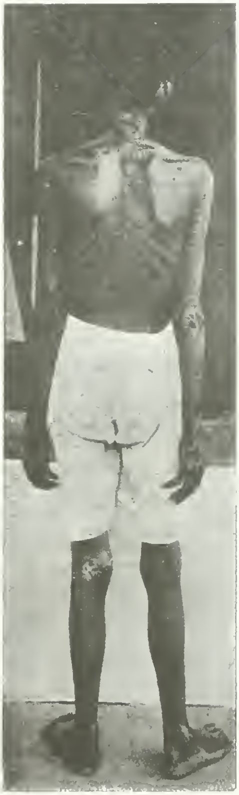
Original Communication.

NOTES ON A CASE OF PELLAGRA.

By A. Visvalingam.
Assistant Surgeon, Taiping, Federated Malay States.

Patient, a Chinese male, aged 32, was admitted to the District Hospital, Taiping, on November 18, 1916. He has been in this country for twelve years, and is by occupation a mining coolie, living in a Chinese Kongsi at the Kamunting Mines.





On admission he complained of looseness of the bowels, pains in the abdomen, dryness of the mouth, thirst and difficulty in swallowing, general weakness, and numbness of the hands, legs and feet, occasional giddiness, and insomnia. He said he had had these symptoms on and off for eight months. He had been admitted to hospital about six months previously for general weakness and diarrhœa.

Present Condition.—Patient is emaciated and looks worried. His gait is unsteady and shuffling in character. He can walk only a few feet. He has a dark-brown dermatitis on the exposed parts of the body, viz., the dorsum of both hands and the lower third of both forearms, the dorsum of both feet and the lower third of both legs, the front of the chest over the manubrium sterni, the back of the neck and the spine down to the level of the third dorsal vertebra. The skin involved is swollen and tense, and is defined by a raised border almost black in colour. The tongue is very clean and raw-looking. The epithelium along the edges is denuded. There is ulceration of the inner surface of both lips. Some of the teeth are carious.

A pathological examination of the skin showed only a microsporon of the furfur group.

A differential count of the blood gave the following:—

Polymorphonuclear leucocytes ...	51·36	per cent.
Large mononuclear ,, ...	13·63	,,
Small ,, ,, ...	32·27	,,
Eosinophils	2·71	,,

No parasites were found in the blood. There were several liquid stools daily without mucus or blood; no organisms were found on microscopical examinations. Examination of the urine also proved negative. There is loss of sensation below the knees; the knee-jerks are absent. Tenderness along the scapular lines in the lumbar region is marked. There is general atrophy of the muscles with inco-ordination.

According to Castellani, the diagnosis rests on the following:—

(1) The nature and distribution of the skin lesion.

(2) The condition of tongue and mouth.

(3) The nervous manifestations.

All of which in this case are more or less typical.

The following may also be of interest as factors in the ætiology:—

(1) The nature of the occupation necessitating the patient being constantly exposed to severe sunlight.

(2) The insanitary condition under which he lives, viz., the vicinity of swamps and pools of stagnant water that are usually found in the neighbourhood of a mining Kongsi.

(3) The poor diet, consisting of rice and vegetables, which are more often stale than fresh.

As the disease is rare in this country, a record of this case may be desirable.

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Sterilization Treatment of Furunculosis (J. T. Bowen, *Boston Med. and Surg. Journ.*, January 18).—The principle of this treatment is simply to keep the skin so far as possible sterile; as free from micro-organisms as it is endeavoured to maintain it in abdominal surgery. In order to effect this the patient is directed to take a hot bath morning and night, scrubbing the whole body, including the head, while in the bath, with soap. After this thorough washing with soap and hot water the skin is dried, and the whole surface again bathed, this time with a saturated solution of boric acid in water, with the addition perhaps of a small proportion of camphor water. After bathing thoroughly with the saturated boric acid solution the skin is allowed to dry. Then the individual furuncles are treated by dressing them with the following ointment spread on cotton or linen and bound lightly on:—

℞	Boric acid	ʒ j
	Precipitated sulphur	ʒ j
	Carbolated (1 in 40) soft paraffin ...	℥ j

These procedures are repeated morning and night. Every stitch of linen worn next to the skin should be changed daily, and in the case of extensive furunculosis all the bed clothing that touches the individual, as well as the night clothing, should be subjected to a daily change.

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THE JOURNAL OF

Tropical Medicine and Hygiene

APRIL 16, 1917.

OPPORTUNITIES FOR ORIGINAL RESEARCH IN MEDICINE IN INDIA.

SURGEON-GENERAL SIR C. PARDEY LUKIS, K.C.S.I., Director-General Indian Medical Service, in a paper recently read before the Royal Society of Arts [by Sir Havelock Charles], advocates that opportunities be extended to India whereby systematic research in the direction of closer study and investigation may be more amply afforded. The chair was occupied by the Right Hon. Austen Chamberlain, M.P., the Secretary of State for India. In the paper it was announced that two schools of tropical medicine have been established in India; one, in Calcutta, is practically completed and will be opened under the directorship of Sir Leonard Rogers as soon as the cessation of hostilities sets free the men required for the professional and teaching staff. The other school, at Bombay, now being erected will be under the charge of Major Glen Liston. These two great schools do not, however, represent by any means the total of "study centres" in India. The authorities of the Madras Medical College contemplate providing a pathological institute with provision for post-graduate and research work in tropical medicine. Schools, institutions and laboratories will be amply staffed. We have only to mention a few names of men in India to show that this will be so, for several of them enjoy world-wide fame. Sir Leonard Rogers, Haffkine, Glen Liston, Christophers, Buchanan, McCarrison, Gibson, Acton, Knowles, Mackie, Nicolle, Browse, Jukes, Bentley, Fry, Majoribanks, Kenrick, McGilchrist, Morison, and a host of others of great distinction. To Semple's wide grasp of affairs the extension of research laboratories was largely due; but to Sir Pardey Lukis's enthusiastic advocacy the present foundations on sure bases are to be accredited.

It is to be hoped that the subject of tropical hygiene will not be lost sight of in these laboratory activities, and that men of the stamp of Sir Ronald Ross, Professor W. J. R. Simpson, C.M.G., and Walter G. King, C.I.E., will be found to carry on the work they so devotedly started.

As to the research field open to students, it may well be said to be illimitable. Tropical diseases are at the doors of the schools and in the wards of the hospitals in India. Insanitary conditions abound and call for remedial measures, not the measures suitable for European countries, but for conditions peculiar to India, demanding specially trained hygienists and sanitarians acquainted with tropical environment and the temperament of the people, and endowed with the tact necessary to overcome local ignorance and opposition. The investigator's life is a simple one as regards dealings with the public, but the sanitarian to be successful has to be endowed with superlative gifts in order to bring the findings of the laboratories to a practical issue amongst the community. Sir Pardey Lukis says it is only about twenty years since tropical medical teaching was first brought forward. He is within the truth, for it was in October, 1898, that, at a meeting at the Imperial Institute, Sir Joseph Fayrer, Bart., in the chair, that Mr. James Cantlie first brought the subject forward publicly in a paper he read on that occasion. The site of the school was one of sharp debate. Sir Patrick Manson, who was present, advocated the Seamen's Hospital in London, Dr. Thin recommended Naples or Bombay, and Sir Joseph Fayrer upheld the claims of the Netley School as the centre for teaching the subject. Sir Patrick Manson enlisted the compelling enthusiasm of Mr. Joseph Chamberlain in the matter, with the result that the Seamen's Hospital, Albert Docks, London, became the established centre, and the great London School of Tropical Medicine was established.

At Liverpool, almost simultaneously, under the stimulating influence of Sir Ronald Ross and that wide-minded pioneer of the union of science and of commerce, Sir Alfred Jones, a school similar to that in London was started and flourished.

Dr. Thin's suggestion that Bombay should be a centre is now being fulfilled, and beyond Bombay the good seed will spread throughout the length and breadth of India to a degree which promises well for India and for the spread of knowledge to all tropical and subtropical regions throughout the world.

It is to be hoped that the training schools in London and Liverpool will not forgo their efforts. In them medical men proceeding to the Tropics should be trained in "methods," in the pathology of tropical diseases, in all the necessary preliminary details which research entails in the natural history of the fauna which carry disease, and thus to pave the way for practical work whether in the laboratories of research or at the bedside of the patients.

Laboratory research has its importance, its incontestable usefulness, but it is well to remember that its work should be directed towards the welfare of the sick and the maintenance of the health of the community. It is not to its advantage that it is so largely conducted in this and other countries as a thing apart from clinical centres and from hospitals, that schools of hygiene are apt to become more academic in their natures than practical in their application, and that our skilled investigators are not dealing directly with the sick as part and parcel of their work. Sir Patrick Manson stands out amongst our pioneers as one who blended clinical work with scientific investigation, and possessed a mind endowed with both scientific investigation powers and clinical ability. He regarded one as the complement of the other, he is an example of both a laboratory investigator of the highest quality and a clinical expert of supreme ability: A rare combination, but one which represents the ideal physician and a goal to which all present and future medical men ought to direct their purpose and ambition.

That the new schools in India will thrive there can be no doubt; that they will produce men from amongst the Indian students capable of rising to a high position in the scientific world there is no doubt, and that the standard of medical knowledge through the length and breadth of India will be heightened is a goal both attainable and to be attained.

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Annotations.

The Etiology and Pathology of Non-Tuberculous Renal Infections (Cabot and Crabtree, *Surg., Gyn., and Obst.*, November, 1916).—Bacteria circulate in the blood and are excreted by the kidney without producing gross lesions in that organ. Also, bacteria circulate in the blood and are excreted through the kidney with lesions of mild or severe nature. Ascending infection by the urinary passages or by the lymphatics do not occur. Suppurative renal lesions which contain a definite embolus shown to contain micro-organisms in a blood-vessel at the apex of the lesion are emboli. A metastatic lesion is one produced by an organism of the same character as one concerned in a demonstrable suppurative lesion elsewhere in the body. The term hæmatogenous should mean simply that the organism reached the kidney by the blood. An excretory lesion is one produced during the process of excretion of organisms by the kidney. Kidney infections are divided into two groups. Group 1 includes all those infections which occur in an organ previously sound, and Group 2 those infections which occur in a kidney previously unsound, such as those damaged by stone, uric obstruction, or chronic nephritis. Clinical findings, operation or autopsy lesions in a series of sixty cases show that the lesions produced by pyogenic organisms differ in essential particulars, and are distinguishable from those produced by non-pyogenic organisms. Lesions produced by the pyogenic group are those of perinephritic abscess, capsular abscess, capsulitis, cortical abscess, septic infarct and diffuse suppuration. The lesions produced by the colon-typhoid group of bacteria were found to be acute pyelitis, acute pyelonephritis, chronic pyelonephritis and pyelonephrosis. Also infection by both pyogenic and non-pyogenic organisms will produce a mixture of the lesions characteristic of both groups. These facts have an important bearing on diagnosis. It is believed that if, with clinical evidence suggesting a renal infection, freshly drawn urine shows cocci in abundance with a small amount of albumin, a few red cells and many leucocytes or a little pus, together with a renal function at or near normal, a diagnosis of coccus infection of the kidney is justified. If, on the other hand, a similar examination shows many bacilli, a little albumin and much pus, coupled with a markedly diminished kidney function, a diagnosis of colon bacillus infection is unavoidable.

Abstracts.

NEW YORK ACADEMY OF MEDICINE.[1]

January 18, 1917.

Etiology of Typhus Fever in Mexico.

P. K. Olitsky, B. S. Denzer and C. E. Husk: This report presents the results of an expedition into Mexico during the early part of 1916 for the purpose of studying typhus fever. The work was done in Matehuala, a town with a population of 10,000, in which the estimated number of cases during the winter months was 500. The mortality was 20 per cent. Clinically, the disease corresponded to the classical type. The scientific work consisted in virus and bacteriologic studies, serologic tests, work on the pathogenicity of the organism recovered from the blood, and prophylactic inoculation with a vaccine from the *Bacillus typhi-exanthematici*. The virus studies confirmed previous observations that the blood of typhus fever patients removed during the height of the disease and injected into guinea-pigs produces a rise in temperature of from four to eleven days' duration after the incubation period of from seven to fourteen days. The Mexican virus was transmitted in this manner through three generations of animals. Blood cultures were taken in thirty-one cases and numerous controls. The technique and mediums employed were those used in the original studies in New York in 1914, except in three cases. Of the twenty-eight cultures made on 2 per cent. glucose serum agar, only eight could be followed a sufficiently long time. These eight cultures showed an organism identical with that first isolated and described by Plotz in 1914. Agglutination tests performed on the serum of typhus fever patients with the *B. typhi-exanthematici* confirmed the previous findings. The organism obtained from the blood, as well as that isolated from lice, was identified by its morphologic and cultural characteristics and serologic reactions. The organism is a slender bacillus about 1 micron in length, usually Gram-negative, although many strains are Gram-positive. It is an obligatory anaerobe, and grows sparsely on 0·5 per cent. serum glucose agar; it ferments glucose, maltose, inulin and galactose, and fails to ferment lactose, mannite and saccharose. Agglutination, using endemic typhus serum against Mexican strains, showed positive reactions in four out of five of those tested. In like manner, complement fixation tests against typhus immune serum showed uniformly positive results, and uniformly negative results with non-typhus serum. In a word, there is a complete correspondence culturally and serologically of the Mexican organism with the bacillus of Plotz. Experiments on guinea-pigs indicated that the organism is pathogenic for this animal in the original culture, and loses its virulence on repeated cultivaton.

Isolation of the Bacillus typhi-exanthematici from the Body Louse.

One of the results of the expedition was the finding of the same organism in infected lice which Plotz reported as the etiologic agent of typhus fever. The work in Mexico on typhus-infected lice may be grouped into (1) the production of typhus fever by the injection of infected lice, and (2) the isolation of the typhus bacillus from such lice. In two instances the injection of thirty and sixty-five lice, respectively, intraperitoneally into guinea-pigs led to the production of typhus fever. In the one case cultured the typhus bacillus was recovered from the spleen of the guinea-pig. Six series of lice taken from five different typhus patients were cultured. From all of these lice the typhus bacillus was isolated. In all the experiments made these lice were proved infectious. A striking observation was that these organisms are usually Gram-negative in the original colonies. After one or two subcultures they become definitely Gram-positive. Since 1910 many observers have reported the finding of an organism in typhus-infected lice, but not in normal lice. This organism is believed to have a causal relationship to typhus fever. In Mexico we were able to grow the bacterium and to show that morphologically, culturally and serologically it is identical with the typhus bacillus.

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[1] Abstracted from *Journ. Amer. Med. Assoc.*, February 17, 1917.

Etiology and Epidemiology of the Typhus Fever of Eastern Europe.

G. Baehr and H. Plotz: The bacteriologic studies made on sixty-four individuals with the disease demonstrated that the *B. typhi-exanthematici* is regularly present in the blood of people suffering from the typhus fever of eastern Europe. In Volhynia anaerobic blood cultures were positive in nineteen out of twenty-four cases, or 79 per cent. of cases studied. In the Balkans, where blood cultures often could not be placed in an incubator until four or five days after they were taken, the percentage was lower, 47·5. The relative bacteræmia was also proportional to the severity of the disease. For example, in the Russian typhus in which the mortality was 5·5 per cent., and in the Balkan 1915-1916 typhus in which it was 11 per cent., the bacteræmia was greater than in the New York series in which the mortality was negligible, 0·2 per cent.; it was much less than in the Mexican typhus (mortality about 20 per cent.) or the severe Balkan type of the disease (mortality from 18 to 60 per cent.). It was found, furthermore, that during chills enormous numbers of organisms may be present in the blood, the maximum being 1,183 colonies in 13 c.c. of blood. Morphologically, culturally and serologically, the organisms recovered from these Russian and Balkan patients were identical with those originally recovered in the New York cases. The *B. typhi-exanthematici* has therefore now been recovered by the authors and others from typhus fever patients in the United States, Mexico, Serbia, Bulgaria, Austria and Russia. The maximum titre of agglutinins for *B. typhi-exanthematici* in the blood of the cases studied was 1 : 1,600; the average was 1 : 200. As a result of systematic studies carried out in 100 cases of typhus fever, it was found that agglutinins usually first appear in the blood on about the tenth or eleventh day of the disease, or at about the time when the temperature begins to fall. The agglutinin titre of the serum then rapidly increases as the temperature drops to normal, and reaches its maximum toward the end of the first or the beginning of the second week of convalescence. At this time 97 per cent. of the serums were positive. After this time the agglutinins diminish in amount very slowly, and usually persist in the blood for many months. The curve of the development of specific agglutinins in typhus fever is therefore a typical immunity curve. During the course of the work specific agglutinins and complex-fixing antibodies were found in the blood of twenty normal persons, in amounts otherwise observed only in convalescents from typhus fever. None of these persons had ever shown any clinical manifestations of typhus fever. These twenty patients were either physicians, nurses or male attendants in typhus hospitals in which they were constantly handling typhus patients, or they were peasants who had been living with relatives or friends ill with the disease. As these twenty contacts were the only persons, aside from typhus convalescents, in whom such findings were made, it was reasonable to assume that during the time of their exposure to typhus fever they had actually been infected with the bacilli in quantities sufficient to induce the clinical manifestations of the disease, and had reacted with the production of specific antibodies. Such persons, who have probably become immune without having the disease, may act as carriers of infected lice and be agents of their distribution throughout a community.

Studies in Prophylactic Immunization with the Bacillus typhi-exanthematici.

Vaccination was carried out in Serbia, Bulgaria, Russia and Mexico during the winter of 1915-1916. The vaccinations were restricted as far as possible to those persons who were most exposed to infection. In addition to the doctors, nurses and orderlies, many other hospital units were vaccinated, and in a few instances small military groups. The reactions following vaccination were very slight. Among the 5,251 vaccinated persons in Bulgaria there occurred only three cases of typhus fever; one of the patients died. After completion of vaccination, although 300 patients were admitted in the subsequent three weeks, no further house infection occurred. In Volhynia 3,169 persons in forty-six institutions were vaccinated, and up to May, 1916, there occurred only three cases of typhus fever among those vaccinated. About 2,000 were vaccinated in Mexico, but owing to the fact that the men carrying on the work had to leave Mexico, no statistics are as yet available. Whatever reports have come from Mexico up to the present time seem to be favourable. Altogether 8,420 persons, members of 109 hospital, sanitation and other units in Serbia, Bulgaria and Volhynia, were vaccinated during the epidemic of 1915-1916, and only six of this number developed the disease during the four months of the epidemic.

Severe chills occurred in some of the cases seen in the Balkans. It is a peculiar fact that typhus fever manifests itself in the beginning with chills, which were not seen in other diseases, except perhaps malaria, and in some cases the chills lasted for hours. Occasionally chills are observed in children, but very rarely; commonly typhus in children does not begin with a chill, or perhaps a slight chill might be overlooked. The mild course of the typhus tabulated in the statistics might be explained by the fact that most of the patients were Jews, and the course of typhus in some races, such as the Jews and Arabs, was mild and the mortality was not so high as among other races. The most severe cases occurred among the Russian peasants. As to the body louse being the transmitting agent, this is probably true, because typhus is a disease of the poorer classes.

NATHAN A. BRILL: There is not the slightest doubt that the *B. typhi-exanthematici* is the only cause of typhus fever, and that the body louse is the agent of transmission of the epidemic form of the disease to man. There is some doubt in my mind whether it is the only agent concerned in the transmission of the endemic form of typhus fever. It has been conclusively shown that the body louse is rendered inactive by temperatures above 20° C. (68° F.), that the optimum temperature for its life and activity is between 12° and 14° C. (53·6 and 57·2° F.), and that it is impossible to keep lice alive in the presence of food in test tubes exposed even to the moderate temperature of the vest pocket. The effect of heat on the body louse is utilized by the peons of Mexico, whose important article of dress is the blanket, which is used for all purposes of covering. To rid their blankets of lice they expose them to the warm rays of the sun, and on shaking them thereafter the lice thus rendered lethargic fall off and are removed. It appears that the body louse is active in cold and inactive in warm temperatures. This fact would explain many of the epidemiologic features of *epidemic* typhus fever, a disease chiefly confined to the colder regions of the earth, and when it does occur in the warmer latitudes it is restricted in the main to the highlands where the daily temperature is low. All statistics will show, whether you search the English, the German, or the Russian, in all of whose countries epidemic typhus fever has repeatedly appeared, that this form of the disease is rampant in the winter and diminished in severity and in the number of infected people as the summer approaches, when it disappears almost entirely. When, on the other hand, one studies the facts which relate to the endemic form of typhus fever as it existed in New York City, it is found that by far the greatest number of cases of endemic typhus fever occur during the summer months, when according to investigators the body louse is inactive and does not live. A study of the statistics dealing with this point shows that 60 per cent. of all endemic typhus fever cases occurred in the four summer months, between June and October, while the remaining 40 per cent. were distributed over the other eight months of the year, with by far the fewest cases in the winter, the very reverse of the situation as regards the epidemic form of the disease. This induces me to believe that either we shall have to modify our views in reference to the effects of temperature on the body louse, which seem fairly well established, or that we shall have to look for some other agent of transmission of the infection in the endemic form of typhus fever. Another argument in support of this view is furnished by the fact that house and family infection of the endemic form of this disease practically does not exist. In over 400 cases of this form of the disease observed by me, I have never seen more than one member of a family affected at even approximately the same time until last spring, when the first cases of nearly simultaneous infection of husband and wife were seen in the hospital. If the body louse transmits the endemic form of the disease one would expect marital infections to be very common. Such infections are extremely rare and practically *nil*. Therefore, while I am not prepared to say that the body louse is not an agent in the transmission of endemic typhus fever, I hope to see more positive proof than has been offered that there is no other source and agent of infection in the endemic form of the disease.

NEURITIS AND PARALYSIS AS A COMPLICATION OF THE INTENSIVE PASTEUR TREATMENT.[1]

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A SUMMARY of the literature with a report of the cases show the sum total of paralyses following the Pasteur treatment to be 142, with twenty-four deaths. With the additional cases described in Table I, the number of paralyses is increased to 150, without taking into consideration the seven cases reported as neuritis. Attention is particularly called to the two cases of optic neuritis heretofore not described in the literature. With the etiology of this complication very much in doubt, it is best that one call attention to the seemingly important factors of the cases in this series.

STUDY OF CASES.

(1) The percentage of involvement of the central nervous system including the cases of neuritis in the series of intensive Pasteur treatments in which these cases occurred, numbering approximately 1,600, was 0·9 per cent. This percentage is in excess of what is usually reported, and would lead one to believe that many cases go unrecognized. Considering the paralyses alone, the incidence was 1 : 200 in those treated in this series.

(2) No children were affected. It is of interest to note that Cases 6 and 7 were in physicians.

(3) The paralysis occurred in one person (Case 2) who was not bitten. Again, it occurred in one person (Case 6) who was bitten, but not by an animal which was rabid.

(4) Cases 4, 5 and 6 were treated with the same set of virus with fifteen others. This virus was

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[1] Abstracted from *Journ. Amer. Med. Assoc.*, Feb. 17, 1917.

TABLE I.—PARALYSIS.

Case	Diagnosis in biting animal based on	Onset days after		Site of involvement	Time of recovery
	Negri bodies or inoculation; observed symptoms; suspicious history	Bite	Beginning treatment		
1	+	21	17	Unilateral facial paralysis	Traces 9 months later.
2	Treatment taken as a precautionary measure	...	28	Partial paralysis legs; considerable diarrhœa present	Six weeks.
3	+ No bite; supposed cuts on hand	21	15	Paralysis legs; partial paralysis arms and face, sphincters	Partial recovery 3 weeks later.
4	+	24	17	Paralysis both legs; cerebro-spinal fluid withdrawn and inoculated subdurally into guinea-pigs, with negative results	Several weeks later.
5	+	18	13	Bilateral facial paralysis, with involvement of lower limbs, sphincters, and, to a smaller extent, the arms; prodromal symptoms of extreme nausea and severe local reactions, with rise of temperature	Traces 16 months later.
6[1]	Dog well; treatment taken as a precautionary measure, and self-administered	12	10	Paralysis both legs and sphincters; simultaneous with the beginning of involvement of nervous system there was a "flaring up" of all previous local reactions with a sharp rise in temperature	Traces 7 months later.
7[1]	Pricked on thumb with needle while administering the Pasteur treatment	...	17	Paralysis of legs	Several months.
8	+	...	17	Paralyses of legs and sphincters; severe local reactions after each injection, the paralysis following unusually severe ones; no rise of temperature	Reported slowly improving four months later.

[1] Physician.

checked culturally, aerobically and anaerobically, with sterile results. From these cases one would be led to believe that there was some idiosyncrasy on the part of the ones affected. An idiosyncrasy not being a complete explanation, one would consider the symptoms presented as a result of fixed virus infection.

TABLE II.—NEURITIDES.

Case	Diagnosis in biting animals based on Negri bodies or inoculation	Onset days after		Site of involvement	Time of recovery
		Bite	Beginning treatment		
9	+	34	31	Spasmodic contraction muscles side of neck	Several weeks.
10	+	48	45	Spasmodic contraction muscles side of neck	Several weeks.
11	+	23	19	Double optic neuritis followed by complete blindness of a few days' duration	7 weeks.
12	+	34	30	Severe pains left eye, later affecting side of face, occurring at intervals	2 weeks.
13	+	21	17	Double optic neuritis followed by complete blindness with gradual recovery of vison	Several weeks.
14	+	—	—	Continuous vomiting ...	Immediate.
15	+	21[1]	18[1]	Extreme numbness of fingers and toes with some extension to arms and legs	Several weeks.

[1] Contact.

(5) In Cases 2, 5 and 6, observed personally, one would be apt to judge the patients as having such temperaments as to predispose to some involvement of the nervous system.

(6) In Cases 2, 3, 4, 5, 6, 7 and 8, the condition was apparently a myelitis, yet in others the peripheral nerves seemed most involved. Facial paralysis alone was noted in one case (Case 1). There is no doubt that bulbar symptoms were present in Case 5. The involvement may be of a selected nature, as shown by Cases 11 and 13.

(7) In Case 3, though the treatment was discontinued and resumed with no ulterior results, I am convinced from observations of Cases 5 and 6 and the alarming symptoms presented that the continuation of the treatment was bad judgment. There must be a border line, so to speak. The latter cases around the seventh day of treatment presented definite prodromal symptoms of nausea and temperature. In Case 6 the treatment was discontinued for two days, with a return of the patient's condition to normal. The resuming of the treatment brought on an immediate and much aggravated return of the initial symptoms coincident with the appearance of the paralysis.

(8) One can easily grant that the local reactions observed during the course of the Pasteur treatment are an indication of the individual's hypersusceptibility to foreign proteins. Then the flaring up of

these reactions simultaneously with the beginning of the symptoms of involvement of the nervous system observed in Case 6, and to a lesser degree in Case 8, is most interesting. These cases readily support the anaphylactic theory.

(9) The shortest incubation period of the paralyses was ten days. In one instance it was twelve days, in one thirteen days, in one fifteen days, in three seventeen days, and in one twenty-eight days.

COMMENT.

There is no doubt that in some persons to whom the intensive Pasteur treatment is administered, 0·9 per cent. in our series, taking into consideration the cases of neuritides presented, there occurs some involvement of the nervous system, with possible serious results. Therefore the intensive Pasteur treament is not without danger, and warning should be given accordingly.

This involvement may be of the nature of a definite myelitis which is most probably rabic. The short incubation period as demonstrated in the cases reported here seems characteristic of fixed virus, yet it must be remembered that comparatively as short an incubation period is seen in cases of human rabies, as a result of street virus infection, overwhelming in every instance. No single etiologic factor can explain every case, as in Case 6 in my series. The patient was not bitten by a rabid animal. Either theory—an idiosyncrasy anaphylaxis, or fixed virus—is applicable to this case. Though continuation of the Pasteur treatment in some of the cases of paralyses may not appreciably affect the course of the disease, in others it may be fraught with grave danger, as illustrated by Case 6.

CLINICAL OBSERVATIONS ON DYSENTERY.[1]

By T. J. Carey Evans.

House-flies are the main source of bacillary dysentery; in far the larger proportion of cases drinking water is the main source of amœbic infection. This form of dysentery rarely makes its appearance during the first few weeks, or possibly months, of a campaign. It only begins to show itself when the troops are beginning to become fatigued or exhausted. It occurs far more frequently during the colder months than during the hotter, so that flies cannot have the same share in its propagation as they have in conveying the bacillary form. It frequently follows after an attack of bacillary dysentery; here again the soil is prepared for it.

The entamœba is, in the greater proportion of cases, conveyed by means of drinking water. It may produce dysentery at the time, or it may lie dormant and only show its presence when its host has become debilitated, or his resistance lowered by any means.

Symptoms and Treatment.

The symptoms of dysentery vary according to the type of infection and according to the acuteness of the disease. In all forms the most important symptoms are the frequency and character of the stools and the degree of tenesmus. From these the severity and progress of each case must be judged. The temperature runs no special course, but as an aid to treatment it must not be overlooked. In severe acute cases it may run up to 104° or 105° F., while in others it may be subnormal. In the latter type of case there may be varying degrees of collapse, which should be treated accordingly.

The disease in some cases begins as simple diarrhœa; in others the onset is sudden, with frequent stools containing varying quantities of mucus and blood, with colicky pains in the abdomen. Tenderness over the descending and sigmoid colon is also a frequent sign.

In severe cases the fæcal element in the stools soon disappears, and the patient passes large quantities of mucus tinged with varying proportions of blood. In some cases after a few days there may be no trace of blood to the naked eye, while the patient may pass frequent motions containing large quantities of purulent mucus.

Tenesmus as a rule is not very marked in the bacillary type, and may be absent altogether. This is the symptom which is almost characteristic of amœbic dysentery. In severe cases it may be so intense that the patient dare not leave the commode, while the pain and straining may bring on a certain degree of collapse. All the patient passes in such a condition consists of very small quantities of blood-stained mucus.

All cases of dysentery should have absolute rest in the recumbent position.

The diet should be very sparing and should consist at first of nothing but barley water or rice water, later milk may be given, but, should the milk be passed undigested, whey should be given instead or a few grains of sodium citrate added to each pint, and the result watched in each stool.

As the patient progresses rice, thoroughly boiled in water, is the best solid to begin feeding with. It is easily digested and does not contain too much starchy matter like sago, arrowroot, &c. Great care should be taken with the dieting, and the importance of personally examining every stool passed by the patient cannot be sufficiently impressed. From this inspection only can the diet be regulated.

All cases of acute dysentery coming into hospital were given 2 drachms of magnesium sulphate every two hours until the stools became fæculent or until 2 oz. had been given. This was done as a routine measure unless the dysentery was of the amœbic type.

This method of treatment with rest and dieting has proved in my experience to be most satisfactory. If there were no improvement from this, the patient was then given bismuth salicylate and salol āā 10 gr. three times daily for three or four days, and at the end of this again went through a course of the magnesium sulphate treatment.

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[1] Abstracted from *Brit. Med. Journ.*, March 31, 1917.

Should the patient have intense pain, hot fomentations applied to the lower part of the abdomen will frequently relieve it; otherwise 10 gr. of Dover's powder will be found to act satisfactorily.

The promiscuous injecting of emetine in every case of dysentery is distinctly harmful. It should only be used in those cases that are distinctly amœbic in type, or in which the entamœba has been discovered in the stools. Emetine was found to have little effect in cases of mixed dysentery until the patient had gone through a course of the saline sulphate treatment first, when it had the same action as in cases of simple amœbic dysentery.

The injection of emetine should not be done indiscriminately, and the result of each injection should be carefully observed. In suitable cases a grain should be injected subcutaneously night and morning. If no good results occur after four injections, it should be stopped, on account of the depressing influence it exerts. It can be resumed after a few days' interval if thought necessary.

Chronic Dysentery.

Chronic dysentery is a far more difficult and intractable condition to treat. The results of medical treatment in bad cases that have persisted for several months have proved to be very unsatisfactory. The majority of chronic cases are by no means simple infections, other intestinal micro-organisms step in as soon as the bowel becomes seriously damaged, and a state of chronic toxæmia arises.

From *post-mortem* examination of the large intestine in a few cases that died, my conviction that medical treatment has very little influence on the progress of the disease was verified. In practically all cases examined the whole of the large intestine was an abscess cavity with extensive ulceration and in parts total destruction of the mucous membrane. Where an attempt had been made at repair the intestinal wall had become converted into dense fibrous tissue, which would in time have formed strictures and have been liable to break down on the slightest injury. The pus, which lined the whole mucous lining, was very foul, and it was evident that the *Bacillus coli* took an active part in helping to bring about the condition. The immediate results of appendicostomy and washing out the large intestine with ordinary eusol solution were excellent. All cases operated on were in an extremely debilitated condition, and some were actually scorbutic, the shock from the operation itself was *nil*. The lavage was done night and morning through a fine rubber catheter and fully two quarts of eusol allowed to pass. The patient experienced no pain or inconvenience, and the fluid was passed by the rectum within ten minutes or so. The fluid passed cleared away all the foul débris in the large intestine, and absorption was prevented, the stools that were passed were rendered far less foul, the septic appearance of the patient improved wonderfully, and the temperature came to normal. Difficulties arose later owing to the appendix contracting and to the skin wound closing up. This operation gives good results for a time, but they are not maintained. Relapse is almost certain to occur, the reason being that it does not provide the necessary rest for the large intestine.

The ideal treatment in such cases would be an ileocolostomy with appendicostomy and lavage. It is only in this way that the bowel can have the required rest. The injection of emetine in cases in which the *Entamœba histolytica* is proved to be present should be carried out; of its specific action on the entamœba there is no doubt; still its action on the ulcerative and septic changes in which at this stage other organisms are taking part is *nil*.

THE HECHT-WEINBERG-GRADWOHL TEST IN THE DIAGNOSIS OF SYPHILIS.[1]

By R. B H. Gradwohl.

A positive Wassermann is laboratory proof of syphilis, but a negative Wassermann is by no means a method of proving that syphilis does not exist.

The Wassermann test, while therefore a boon to us in diagnosis, is at the same time, in other instances, a crushing disappointment. How often does this occur? It is almost impossible to estimate accurately the percentage of positives that are to be found in all syphilitic cases that are daily examined throughout the medical world. My own experience of nine years in the work entitles me to estimate it in terms of possibly 60 per cent., that is, of all syphilitics examined, including blood and spinal fluid Wassermann reactions, we will get 60 per cent. of positive findings in all untreated patients who have passed beyond the primary period.

With these figures before us, it might be well to inquire into the meaning of the 40 per cent. negatives in manifest syphilitic conditions. Is this a fault of the technique or is it due to a temporary or permanent disappearance in the reaction in certain persons and in certain phases of the infection regardless of the application of specific medication? I would answer as a result of my experiences that it is due partly to the first cause and partly to the second. I say this advisedly, because I have been able to add 15 per cent. to the column of positives by utilizing another test which eliminates those errors inherent in the test itself. I have been unable to add much to the percentage of positives by eliminating faults due to factors inherent in the idiosyncratic factors of the patient or of the disease, unknown factors that make his blood and spinal fluid consistently negative at certain times and under certain conditions. I do not include, in the latter statement, however, my use of the "provocative" method of producing positives by means of arseno-benzol injections.

About four years ago my attention was called to the method of Hecht and Weinberg in demonstrating the presence of the syphilitic antibody, if such it may be termed, by a method first described by them. There were, however, certain elements in the method of these workers that logically recommended at least a trial of their methods. In first order is the fact that the method utilized unheated serums. This is undoubtedly a point of superiority over the Wassermann, which utilizes inactivated or heated serums. Heating of blood serum for the purpose of destroying complement unquestionably also destroys part of the syphilitic antibody or substance responsible for complement fixation. If this is true, in the presence of a small amount of this substance the performance of a Wassermann test with inactivated serum most certainly will tend to produce a negative result. Another explanation of this may be found in the claim of those who believe there are two kinds of syphilitic antibody, one thermolabile, the other thermostabile; that in some cases and under certain conditions the thermolabile factor predominates and under other conditons the thermostabile. Granting that a test were to be carried out while a serum was charged with thermolabile antibody and weak or deficient entirely in thermostabile body, inactivation would necessarily destroy the element that would complete complement fixation and give a negative result where a positive should and would have been obtained with an active or unheated serum.

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[1] Abstracted from the *Journ. Amer. Med. Assoc*. February 17, 1917

This fact seems to have some support in addition to my observation from Vladimir Busila,[1] who showed that both blood and spinal fluid contain two syphilitic amboceptors, one thermostabile or unaffected by temperature of 56° C., and the other thermolabile, that is, destroyed by that temperature. He states that one or both may be present and in various proportions. The thermolabile is the first to appear in the blood on syphilitic infection and the last to disappear under treatment. When both amboceptors are present, the Wassermann reaction yields a weaker result when the serum is previously heated than when it is not. He states also that when the thermolabile amboceptor is present alone or nearly alone, the Wassermann reaction with heated serum gives a negative result, but without heating, a strong positive result. The negative blood Wassermann performed with the ordinary technique which includes preliminary heating, is not, therefore, a proof of the absence of syphilitic amboceptor. Busila also makes the observation, which is rather interesting, that syphilitic cases with a positive reaction exclusively in spinal fluids are rare, much less common than is generally thought, and include cases mainly in which the blood amboceptor is exclusively of the thermolabile variety, or nearly so. He states, in the light of his own observation, that by the performance of the blood Wassermann with unheated serum one may thus generally dispense with the cerebrospinal fluid Wassermann. He further believes that the thermolabile amboceptor often exists alone in cases of latent, inadequately treated or nervous syphilis, and the Wassermann reaction performed with the original technique is thus unavailable, precisely in the cases in which it is most needed.

Again, it must be remembered that the Wassermann technique does not take into account the presence of natural antisheep amboceptor. The presence of antisheep amboceptor in the blood serum of persons depends, it is assumed, on the ingestion of mutton. It is impossible to state just how much mutton must be ingested before natural amboceptor appears in the blood. We have seen it present in fairly large amounts in persons as young as 12. The amount of this substance varies within wide limits, as we shall see later. It is fair to assume that if in the Wassermann reaction one utilizes a certain amount of amboceptor made from rabbit's serum and fails to take into account the amount naturally present, then the balance for the hæmolytic system which our titration experiments have established as a prior step to the performance of the actual test is seriously impaired. If, for instance, 0·5 c.c. of a 1 : 2,000 dilution of rabbit antisheep amboceptor will hæmolyse 1 c.c. of a 5 per cent. sheep corpuscle suspension, and already sufficient amboceptor is present in the patient's serum to hæmolyse 1·5 c.c. of sheep corpuscles, as frequently noted, then the balance is most seriously disturbed and reliable work cannot be carried out.

The method of Hecht and Weinberg was pointed out to me during my stay in Paris, by Leredde particularly. The method obviously has much to recommend it in that it utilized unheated serums and took into account the presence of natural amboceptor and natural complement. The method was put on trial, and the principles already mentioned readily asserted themselves as eliminating the errors inherent in the classic Wassermann. After working out Hecht and Weinberg's method, I determined on the expedient of estimating the exact amount of complement and amboceptor present in each serum, and utilized only the exact amount of sheep corpuscles hæmolysable by that much amboceptor and complement. In other words, my work with this test added to the accuracy of the "balance" of the hæmolytic system. The method which I used and first reported before this Association[1] is as follows:—

Place in a rack fourteen small test tubes. The first ten of these tubes are used to determine the hæmolytic index of the suspected blood. This means the exact amount of hæmolytic amboceptor present in the given blood serum. The last four tubes are used in the actual test. Add 0·1 c.c. of fresh unheated patient's blood serum to each of the first ten tubes. Then add decreasing amounts of normal salt solution to these tubes, beginning with 1 c.c., then 0·9, 0·8, 0·7, 0·6, 0·5, 0·4, 0·3, 0·2 and 0·1 c.c., to the succeeding nine tubes. Next add increasing amounts of fresh 5 per cent. suspension of sheep's blood, starting with 0·1 c.c. and ending with 1 c.c. Place the rack in the water bath for one half-hour. The tube which last shows complete hæmolysis constitutes our "hæmolytic index"; if it is Tube 4, our index is 4, because this tube had received 0·4 c.c. of sheep's corpuscles to be added to the last four tubes. The first three tubes (11, 12 and 13) constitute the tubes for the actual test, while the last tube in the rack (Tube 14) serves as our serum control tube. Tubes 11, 12 and 13 receive, therefore, the patient's serum, the proper amount of sheep's corpuscles, dependent on hæmolytic index, rising strengths of antigen, but no complement and no amboceptor. Tube 14 receives only sheep's corpuscles, but no antigen.

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[1] Vladimir, Busila: *Presse méd.*, September 23, 1915.

[1] Gradwohl, R. B. H.: "The Hecht-Weinborg Reaction as a Control Over the Wassermann Reaction," *Journ. Amer. Med. Assoc.*, July 18, 1914, p. 240.

In my technique I use 0·1 c.c. of a diluted antigen, determined by titration in Tube 11, 0·15 c.c. antigen in Tube 12, and 0·2 c.c. in Tube 13. In order to equalize the volume of fluid in all these tubes, I add 0·2 c.c. normal saline to Tube 11, 0·15 c.c. to Tube 12, 0·1 c.c. to Tube 13, and 0·3 c.c. to Tube 14. The tubes are then agitated and placed in the water bath for half an hour. These last four tubes are filled at the time I make the additions to the first ten and are left with them in the water bath for one-half hour for fixation of complement, the rack is then taken out and the hæmolytic index computed. If the index is low, say, from 1 : 4, I add 0·1 c.c. of sheep's blood to the last four tubes. If the index is between 5 and 7, I use 0·15 c.c. sheep's blood to the last four tubes; if between 10 and 15, I use 0·25 c.c., if between 15 and 18, I use 0·3 c.c.; and if between 18 and 20, I use 0·35 c.c. If the patient's serum has an index below 3, I regard the reaction as of doubtful value. If it is above 3, I regard it as absolute. The reaction is read off exactly as in the Wassermann, that is, inhibition or noninhibition of hæmolysis. If the amount of complement or natural antisheep amboceptor is very low, we can add the proper amount of guinea-pig's serum or rabbit's immune serum, ascertained by preliminary titration.

The particular advantage of this test is the fact that we are dealing with unheated serums, avoiding the chance of the development of complementoid substances. The test has never been found negative in any blood serum which showed a positive Wassermann, but it has frequently been found positive in blood serums that show a negative Wassermann. Thus, its advantage can readily be seen.

Having worked out the technique I have consistently followed it up with a close comparison with the classic Wassermann. In every test carried out by me for complement fixation diagnosis of syphilis I have performed both the Wassermann and the Hecht-Weinberg-Gradwohl. Many of these tests were performed without any knowledge of the clinical history in advance, and my reports were unhesitatingly given to my clinical consultants, sometimes showing a positive in both tests, sometimes showing a negative Wassermann and a positive Hect-Weinberg-Gradwohl, sometimes showing negative both, but never showing a positive Wassermann and a negative Hecht-Weinberg-Gradwohl. At first I was astonished at the frequency of the "dissociated reaction," by which I mean the negative Wassermann and the positive Hecht-Weinberg-Gradwohl. The conclusion is that the method eliminates the factors of errors inherent in the Wassermann. In no instance did a positive Hecht-Weinberg-Gradwohl and a negative Wassermann surprise the clinician. There are still certain cases of syphilis in which both tests were negative which were really syphilitic, as proved by true clinical manifestations and later the appearance of positive reactions in one or both tests at a subsequent examination. These were invariably cases of latent syphilis in robust individuals. We wish to add, too, that the use of cholesterinized antigens does not equal in accuracy the use of the Hecht-Weinberg-Gradwohl test as a serologic test for syphilis. We have carried out both Wassermann and Hecht-Weinberg-Gradwohl, and have utilized all the different antigens now in common vogue. We have lately tried out the use of cholesterinized human heart antigen in an endeavour to compare the results obtainable with this method to those obtainable with a noncholesterinized antigen in the Hecht-Weinberg-Gradwohl technique. We must announce that the Hecht-Weinberg-Gradwohl frequently gave undoubted positives when the cholesterinized human heart antigen in the straight Wassermann technique failed to do so. In other words, our positives with the Hecht-Weinberg-Gradwohl cannot be explained on the basis of increasing the *sensitiveness* of the antigen: they can be explained only on the basis of the elimination of the factors at fault already enumerated. Furthermore, negative Wassermann and positive Hecht-Weinberg-Gradwohls does not mean a *faint inhibition* in the latter and a *complete hæmolysis* in the former. The results are astonishingly different and striking, on the one hand a clean-cut negative Wassermann, on the other a definite and distinct positive Hecht-Weinberg-Gradwohl.

A recent publication by Sellards and Minot[1] alludes to the fact that the writers in fourteen cases in only 134 found natural amboceptor in the amount of two or more units. They also mention that where they depended on natural sheep amboceptor no hæmolysis occurred, and there was no apparent explanation for this lack of hæmolysis except the inefficiency of the natural amboceptor. These statements, while based on an absurdly small number of cases and under conditions unknown to us, are so utterly at variance with our findings and our previous statements that we feel it necessary to dwell on them at some length here. Our personal experience now with something like 5,000 comparative Wassermanns and Hecht-Weinberg-Gradwohls show that at least 98 per cent. of the people examined for complement fixation have some amount of natural antisheep amboceptor present. This amount, expressed in terms of "hæmolytic indexes," that is, amount of sheep corpuscle suspension in tenths of 1 c.c. hæmolysable by 0·1 c.c. of serum, varies between the limits of 1 and 20.

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[1] Sellards and Minot; "The Antagonistic Action of Negative Sera upon the Wassermann Reaction," *Journal of Medical Research*, May, 1916.

The average beginning May, 1915, of units of natural amboceptor present was 2 plus, running up to an average of 7 in November and declining to 6 in April, 1916. A number of times we have found an index as high as 15. The highest we have found was a case recently with 20. Our figures for previous years run approximately the same as those for 1915-1916.

In what class of cases and under what conditions are we liable to find the Hecht-Weinberg-Gradwohl positive and the Wassermann negative? We might say that in cases in all periods of syphilitic infection is this finding likely to be found. We have found manifest secondary syphilis with a negative Wassermann and a positive Hecht-Weinberg-Gradwohl; and again, in so-called latent syphilis, in cases of tabes dorsalis, in tertiarism, in untreated cases. In cases of congenital syphilis we have found it time and again. Every Wassermann worker is familiar with the frequent negatives found in this group of cases. We have in general found it present in 15 per cent. more cases than the Wassermann, irrespective of the period of the disease or whether treatment had or had not been instituted. Leredde has called attention to the "dissociated reaction" in ocular syphilis.

COMMENT.

The group of cases in which the amount of natural amboceptor in human serums seems to play a definite rôle in making a Wassermann appear negative and a Hecht-Weinberg-Gradwohl positive comprises the following:—

(1) Cases of ocular syphilis.

(2) Cases of visceral syphilis, particularly of the liver and heart.

(3) Cases of syphilis that have received intensive but inadequate treatment.

(4) Provocative cases in which we are seeking to revive a Wassermann in suspected cases.

(5) Cases of monosymptomatic tertiaries.

It is my belief that this test is far superior in every respect to the Wassermann in point of delicacy of "control" of treatment. Heidingsfeld[1] speaks of the superiority of this test in estimating the finest shades of any remaining trace of the disease in cases under treatment, while he maintains that the Wassermann used in this way estimates only the coarse yearly improvement. This, to my mind, expresses exactly my own position based on my experience with the test in cases under treatment. I have noted that the vigorous institution of antisyphilitic treatment, except in the case of the "Wassermann-fast" subject, quickly reduces a positive Wassermann to a negative. Not so with the Hecht-Weinberg-Gradwohl, however. Long after the Wassermann has become negative and the case very properly still held to the specific treatment, this reaction persists. The reduction of the Hecht-Weinberg-Gradwohl from positive to negative under treatment is far more significant to me as a proof of successful therapeusis than is the Wassermann. Another observation from my experience with this test which might also be mentioned here is that when the Hecht-Weinberg-Gradwohl becomes negative as a result of the intensive treatment that is needed to bring this about, it seldom lapses back to positiveness. In other words, the Hecht-Weinberg-Gradwohl when negative after being persistently positive in untreated syphilis is the "consummation so devoutly to be wished by the syphilologist." This is not a proof positive of "cure," but it has a greater value when repeatedly negative than as a Wassermann under similar conditions.

CONCLUSION.

The Hecht-Weinberg-Gradwohl has been a far better check or control of the Wassermann than the use of any of the controls now in vogue. The so-called border-line Wassermann reactions, if truly positives, will show a strong Hecht-Weinberg-Gradwohl. A supposedly border-line positive Wassermann that shows a clearly defined and complete hæmolysis in the Hecht-Weinberg-Gradwohl tubes is not a border-line at all; it is a spurious reaction and should be thrown out of consideration. There is no better way to control the accuracy of the Wassermann than the use of this test on every blood submitted for examination. While originally advocating this test, therefore, as a control over the Wassermann, at present it has attained the dignity of something more than a mere "control" over the classical test. It should take precedence over this test by virtue of its greater accuracy and be accepted as such wherever it is used. Outside of the extra amount of time necessary in making the test, there is no argument against its widespread and continuous use in the serologic laboratory. The extra amount of labour is more than compensated for by the greater amount of information obtainable. It is not recommended, therefore, solely as a control. Rather it is a far better test than the Wassermann except in the 2 per cent. of cases that have no hæmolytic index. In this small group the Wassermann must remain our ally. In all other cases we could, indeed, eliminate the Wassermann, and lose nothing by so doing. It is only in deference to those who cling to the Wassermann that I continue to place it ahead of the Hecht-Weinberg-Gradwohl in my reports. To my mind it has long since been passed in the race by the Hecht-Weinberg-Gradwohl, and is bringing up a bad second.

No negative Wassermann test to my mind is worth while unless backed up by a negative Hecht-Weinberg-Gradwohl. When both are negative, which occurs in 25 per cent. of syphilitic cases, according to my statistics, then recourse must be had to the various other methods of the clinic and the laboratory for the inclusion or exclusion of any remaining trace of the disease.

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[1] Heidingsfeld: "Serology and Diagnosis of Syphilis," *New York Medical Journal*, April 8, 1916.

Original Communication.

A CASE OF URINARY AMŒBIASIS IN THE ANGLO-EGYPTIAN SUDAN.

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Contents.—*Introductory — Historical — Sudan Case — Remarks — Acknowledgments — References —Illustration.*

Introductory.—Of late more attention has been paid to urinary amœbiasis than has been the case in the history of medicine in the years that are gone. In an exceedingly able paper on "Urinary Amœbiasis as seen in the Gold Coast of West Africa," Scott Macfie says:—

"Considering the wide distribution and frequency of occurrence of amœbic dysentery, it is a somewhat remarkable fact that very few cases have been recorded in which amœbæ were found in the urine."

It is this statement which has caused us to record the following case, the notes of which were written some two years ago, because one of the authors has several times in twenty years' residence in the Tropics observed urinary amœbiasis, but he has never had the good fortune to find them in the freely mobile stage, but always more or less encysted, and more or less degenerate, and this may be one of the reasons why so few diagnoses are made.

This degenerate condition may possibly be because the urine in all the cases was acid, and in each case it seemed by the symptoms as though their origin was high up in the urinary tract, i.e., probably in the pelvis of the kidney. As all the cases we have seen recovered we never had an opportunity of verifying the result by a post-mortem examination, and as the amœbæ were always in precystic or cystic stages, and degenerate thereat, it did not appear to us to be worth while recording our observations, but in view of Scott Macfie's remarks it may possibly enable other tropical practitioners to diagnose this condition if we publish the account of one of our cases, together with a photomicrograph of the unstained precystic stage found by us in this case, because it seems to us that the chances of finding freely mobile amœbæ in acid urine are but slight, and it is possible that when found they take their origin low down in the urinary tract, while the frequently observed precystic and often degenerate amœbæ may possibly come from the pelvis of the kidney.

Historical.—We are distinctly defective in our literature in Khartoum regarding urinary amœbiasis, but Scott Macfie has quite recently published an admirable history, and therefore we must content ourselves by simply inviting the reader's attention to some points which we noted some years ago and to Scott Macfie's writings.

The point which we desire to emphasize in this section of our note is the site of the infection, whether it is high up or low down in the urinary tract.

A.—*Low Down in the Urinary Tract.*

Amœbæ were first described in urine and in vaginal secretion by Baelz in 1883, when he named the particular species which he saw *Amœba urogenitalis* Baelz 1883. This amœba was provided with a synonym by R. Blanchard in 1885, when he called it *Amœba vaginalis* R. Blanchard 1885. It measured some 23-50 microns in diameter, was actively motile, extruded short and blunt pseudopodia, possessed granular cytoplasm containing a vesicular nucleus and phagocyted red blood corpuscles, while cystic stages of the same organism were also observed. There is, in our opinion, no reason to doubt that this is the same species as the organism variously known at the present time as *Loeschia histolytica* (Schaudinn 1903 emendavit Walker 1911), *Entamœba histolytica* Schaudinn 1903, *Entamœba tetragena* Viereck 1907, *Amœba dysenteriæ* Councilman and Lafleur 1891, and by various other names.

The unpleasant point is that if the rules of zoological nomenclature are pressed we ought to call the amœba of dysentery by Baelz's name.

The following cases are known to us:—

(1) Baelz's patient was dying from pulmonary tuberculosis, and it was only shortly before death that hæmaturia associated with severe tenesmus of the bladder set in, and Baelz considered that the bladder as well as the vagina was infected, but it is not evident from abstracts of his paper that any post-mortem examination was made.

(2) In Jürgens' 1892 case the amœbæ were found by post-mortem examination to come from mucous cysts in the bladder of an old woman who had suffered from cystitis, and in whose vagina they were also found.

(3) In 1911 Craig found *Entamœba histolytica* Schaudinn 1903 in an infection of the bladder in which the autopsy showed a minute fistula between the ulcerated intestine and the bladder.

(4) Lynn's 1914 Costa Rica case seems to have been probably caused by a vesical lesion, as the patient is reported to have felt "a pain in the trigonum vesicæ at the end of micturition." He responded very well to emetine treatment, as it is stated "in the course of five days the vesicle tenesmus was relieved and the urine cleared"; moreover, there was no return of the symptoms after one month.

(5) and (6) Scott Macfie's second case was probably a bladder infection associated with Bilharziosis, while his third and fully described case was probably an infection of the genito-urinary tract in the neighbourhood of the seminal vesicles.

B.—*High up in the Urinary Tract.*

In these cases the site of infection is probably in the pelvis of the kidney.

(7) Posner's 1893 Berlin case began with a rigor and the passage of urine tinged with blood, which, when examined, showed red and white blood corpuscles, hyaline and granular casts, and large granular bodies 50 by 28 microns, which slowly altered their shape, and which contained, among other things, red blood corpuscles and one or more nuclei and some vacuoles. Posner, probably correctly, came to the conclusion that the pelvis of the kidney was affected, but seems to have considered that this infection began in the bladder, but in the extract taken from Fantham, Stephens and Theobald's "Animal Parasites of Man" it is not clear why he came to this conclusion.

C.—Site in the Urinary Tract Unknown.

(8)—(10) We have been unable to refer to the original papers written by Wijnhoff, by Jeffries, and by Fisher, and are therefore unable to state where the infection was situate.

(11) The very brief note by Ward, Coles and Friel arouses the doubt as to whether the amœbæ really came from the patient, because they do not state whether these bodies were merely seen once, or whether they were of frequent occurrence. They call the organism *Amœba urinæ granulata*, but, as Fantham has pointed out, in no case can this name stand.

(12) Scott Macfie, owing to the non-return of the patient to the hospital, was unable to define the site of the infection in his first case.

All the cases which we have met with have been associated with symptoms which have pointed to the pelvis of the kidney as the probable source of infection, but it is curious that in the very large number of post-mortem examinations which one of us has made personally he has never met with a single case of amœbiasis of the urinary tract, even though the portion from the pelvis of the kidney to the prostatic urethra was examined in a high percentage of the post-mortems, and even when amœbic abscesses in unusual places were recognized.

All but one of the cases of urinary amœbiasis which we personally have observed have been found in Khartoum, where amœbiasis of various part of the body, but principally of the intestine, is common.

As an example of the only type of urinary amœbiasis with which we are acquainted, we venture to bring forward the following case:—

Sudan Case.—A Greek lady, aged 32, in the practice of Dr. Papatheodorou, of Khartoum, was taken ill on the night of December 17, 1914, with an attack of pain in the right lumbar region radiating downwards into the right buttock, together with the passage of some bloody urine.

Her clinical history indicates that in childhood she suffered from some form of illness believed to be *Volvulus*. She commenced to menstruate at 13 years of age, and continued to do so regularly until after her marriage, except during three months in her sixteenth year. She believes that she has three times suffered from mild attacks of appendicitis for about three days at a time, and says that during the first attack she had some fever. These illnesses appear to have been quite trivial, as she was not confined to bed during their incidence.

Nine months after her marriage she gave birth to a child. The confinement was quite normal in every respect, and no instrumental assistance of any description was required.

Since the birth of her child she has until the onset of the present illness enjoyed excellent health, except for a slight leucorrhœal discharge from which she suffered for a short time in 1913.

About the middle of 1914 she was seized with continuous pain in her lumbar region for a few days, and it was noticed that her urine was turbid, but blood was not observed. Similar attacks have recurred from time to time until the present illness.

She has never suffered from dysentery nor from any vesico-vaginal or vagino-rectal fistula, nor, on examination, can any trace of such be found.

On the night of December 17, 1914, as indicated above, she complained of severe pain in the right lumbar region radiating downwards into the buttock, and this was severe enough to make her feel faint.

This pain lasted all night, during which time she vomited frequently. Next day she felt better, but passed with difficulty a little blood-stained urine, but this urine was not further examined.

During the attack and for twenty-four hours afterwards her temperature varied from 99° to 99·5° F., after which it became, and remained, normal.

On examination she was observed to be of good constitution with normal organs, including the liver and spleen.

No signs of the supposed appendicitis could be detected, nor was there any leucorrhœal discharge.

A differential count of 500 leucocytes gave the following figures:—

Polymorphonuclear leucocytes	61·0
Mononuclear leucocytes	8·4
Large lymphocytes	22·4
Small lymphocytes	5·6
Eosinophile leucocytes	2·2
Mast Cells	0·4
Total	100·0

As no malarial or other parasites could be found in her blood, and there was no enlargement of the liver or spleen in a place like Khartoum, suspicion was at once aroused that there must be an amœbic infection somewhere in the patient's system.

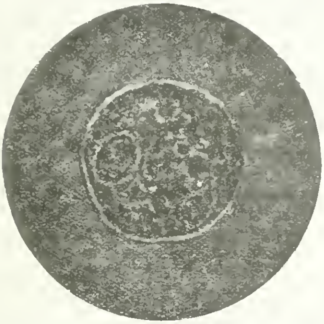
Her urine was collected under aseptic conditions, that is to say, the vulva was washed with a mild antiseptic lotion, and the urine, which was withdrawn from the bladder by means of a sterile catheter, was received into a sterile flask.

On examination it was observed to be dark red in colour and clear, with the exception of a slight translucent jelly-like deposit. It possessed the usual smell of normal urine, and was acid in reaction. The uncorrected specific gravity was 1020, and no albumen or sugar could be detected in the clear, supernatant fluid.

Some of the urine was placed, by means of sterile pipettes, into sterile centrifugal tubes stoppered with sterile cotton-wool and then centrifugalized, when a deposit of mucus was obtained, in which, on microscopical examination, a few red blood cells, leucocytes, and numerous bodies, such as that depicted in the illustration inserted in this paper, were readily observed.

The bodies in question were roundish, measuring about 18 microns in tranverse diameter, and possessing a clear hyaline margin, inside which lay a dark granular cytoplasm containing a clear, roundish, excentrically placed nucleus, which measured about 4 microns in diameter and possessed a karyosome. In addition the cytoplasm contained two or more vacuoles as a rule, and some possessed engulfed red blood corpuscles.

We are of the opinion that the bodies in question represent the pre-cystic stage of the life-cycle of the organism which is now known by the name *Loeschia histolytica* (Schaudinn 1903 emendavit Walker 1911), and we attribute its peculiar appearance and non-motility to the action of the acid urine.



Precystic stage of *Loeschia histolytica* (Schaudinn 1903; emendavit Walker 1911), as seen in urine in a Sudan case. Fresh and unstained specimen. × 1,500 diameters. Photomicrograph. (This illustration may be examined, with advantage, by means of a reading lens.)

The sterility of the urine was tested aerobically in broth, and on agar-agar, Faucus' and Conradi Drigalski's media, incubated at 37° C. and at 40° C., and also by keeping the original flask in the incubator at 37° C. for several days. As a result of these tests it appeared to be quite sterile.

A purgative was administered on two separate occasions, and the fæces carefully examined for amœbæ or other parasites without any being found.

She was given urotropine, and after two days the urine was again aseptically collected, when mucus was still found to be present and numerous degenerating amœbic cysts observed, but no white or red corpuscles were seen. The urine was again tested as above and found to be sterile.

Some days later the urine was again collected with all the above-mentioned precautions as regards asepsis and tests for sterility, when only a very few degenerating cysts could be found embedded in a little mucus. This urine was kept for about six months and apparently remained quite sterile, as it showed no change of any description during this period.

She was treated with emetine and the urine examined again, when neither mucus nor amœbæ could be found, and the urine appeared to be normal in every respect. With this treatment the number of mononuclear leucocytes and of eosinophile leucocytes increased.

She has been under observation for two years since the above reported attack, and has never again shown any urinary symptoms, so that it may be assumed that she is probably cured.

Remarks.—It seems to us that this case is typical of the infection high up in the urinary tract, as in our opinion this woman suffered from *Amœbic pyelitis* of the right kidney, and we consider that she had probably suffered from this infection at all events for six months, i.e., since her first attack of pain.

In other words, we believe that she was a case of *Latent Amœbiasis*, and may possibly be looked upon as a *Chronic Amœbic Carrier* of the urinary type; but, on the other hand, judging from the condition of the cysts, we are inclined to consider that such a carrier is not a source of infection.

Personally, we are inclined to believe that all these urinary infections are derived from the bowel, and that as a rule they reach the urinary tract via the blood-stream, and that it is only in infections situate low down in that tract that the amœbæ directly pass from the bowel to the bladder or urethra via the tissues.

We are inclined to think that all reported cases belong to the species variously called *Loschia histolytica* or *Loschia tetragena.*

We suggest that the reason why more cases are not recorded is because practitioners do not recognize such bodies as that depicted in the illustration given above as amœbæ, and that these are probably the usual form in which amœbiasis of the upper urinary tract is represented in the urine, while the more easily recognized mobile amœbæ come from the lower portions of the urinary tract, and we consider this difference to be due to the more prolonged action of the urine which Scott Macfie's experiments have shown to be deleterious to the amœbæ.

The correct treatment is, of course, intramuscular injections of emetine, while urotropine may be given by the mouth, and the patient at the same time placed upon a suitable diet until cured, as evidenced by examination of the fæces and urine and by differential leucocytic counts of the blood.

Acknowledgments.—We are indebted to Dr. Papatheodorou for much help with regard to the case recorded above, and to Captain Archibald, D.S.O., R.A.M.C., for kind criticisms.

Khartoum,
January 27, 1917.

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Chief Mode of Infection with the Ankylostoma Duodenale and its Route after Oral Infection (Y. Miyagawa, *Mitteilungen a. d. Fakultät der k. Univ.*, Tokyo, 1916, xv, No. 3).—Sunlight is not necessary for the development of the eggs, but rather detrimental, while oxygen and moisture are indispensable. Ankylostoma eggs can be easily destroyed by mixing the egg-containing fæcal material with urine and allowing it to putrefy well. This is extremely important from the practical standpoint. The larvæ can be collected most readily by placing a small dish of pure water in a larger Petri dish containing the egg-laden fæcal material. As the larvæ hatch out, they collect in the water dish as they seek water, and they will be found assembled in this dish in from ten to thirty days. Whether infection occurs by the mouth or through the skin the larvæ pass into the lung tissue to begin their development, and they are more resistant to chemical action thereafter than larvæ that have not been in lung tissues. The young ankylostomas coming from their trip through lung tissue are able to resist the action of gastric juice for twenty-four hours. The chief mode of infection with the ankylostoma is through the skin, as proved by experiments on dogs in open fields. The larvæ are so resistant to lime and other salts that encysted larvæ retained their vitality after being kept for six hours in milk of lime, and for twenty-four hours in the same twice diluted.

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WAR AND FOOD CULTS.

AT the present time the maintenance of physical power when the world's food is scarce is exercising the majority of mankind, the effect of intercourse between nations being reduced to a minimum, owing to interference with land carriage by road, river, canal or railway, or sea carriage by coast traffic or by long voyages. This condition has brought mankind to its knees, so to speak, and made men and women understand that Nature and Nature's ways reign supreme, and that the artificialities of modern life are but as a flimsy veneer to reality. Towns and town life—urbanism—is the detrimental factor in removing man from natural environment and from losing contact with Nature and her ways. Between the being who draws water from the well in the country, and the town dweller who merely turns on the tap in his own house in a town, there is a wide gap productive of conditions of mind radiant with possibilities which are to the detriment of the tap-water drawer. To the man or woman who actually milks the cow, and he or she who insists that the milk is to be found at the door every morning and afternoon come what may—"It must be there, because I ordered it"—there is a gulf of unbridged difference in the conception of things. The child brought up in the experience that water originates from the cistern and the tap and the milk from the milk cart and the milk can at the door is placed in an environment far removed from Nature and stamped with an artificiality of surroundings which engender a "Kultur" detrimental to mind and body. The cry is at present "Back to Nature," the artificialities of civilization are being sapped, and were this War to last longer it might, for a time at any rate, teach town dwellers that they are but human, and not the supreme beings that are so "advanced," pronounced "advāānced," that they are far above and independent of Nature and all her moods and whims and realities; in other words, artificial human beings, oblivious to Nature and productive of conceits and conceptions built upon unrealities. The present scarcity of food by the dwellers in towns is held to be due to bad management on the part of the Government, be it in Germany or in England; so processions, riots, strikes and such expressions of the unreality of things are to hand. The artificially reared being cannot see behind the curtain nor get "back to Nature," which they set aside and despised. The War may prove a divinity which may shape their minds to better things, and teach them that man's body cannot defy Nature, nor his soul be saved by "Kultur."

Cults of various kinds are in the ascendant at present; the pro-meat and the pro-vegetable schools are to the fore, of course. The vegetarians, with their well-known assertions of being "advāānced," are loud in their claims to being the only moralists, and declare that all would be well were a diet of lentils to be followed. The humble lentil is always dragged to the fore by the "platform" vegetarian. The writer has tested their knowledge on the subject by putting a specimen of lentils on the table before them and asked if they knew what the specimen was. "I can't say I do." And when told: "Well, I have never tasted lentils myself, but I am *told* there is a great deal of nourishment in lentils." What a travesty upon Nature it all is. It is well that this subject should be thrashed out. The world's food is largely vegetable: many people on the earth never touch meat; many sections of the community in the British Isles never touch meat from year's end to year's end, and yet are amongst the best specimens in body and mind to be found. Take a farm servant in, say, Scotland, some twenty-five years ago; their diet was: Breakfast—porridge, oatcakes and milk; dinner—potatoes, oatcakes and milk; supper—cabbage or kail, oatcakes and milk. No meat in any form, except perhaps on New Year's day, when it was regarded as not of much account, but dictated by custom on that date. The milk, however, was in quantity not a pint or two, but anything from six to twelve or more pints daily. Moreover, it was skimmed milk, the cream was removed. "Oh, of course, that is Scottish meanness." Not so, it was "Scottish physiology" that dictated it being skimmed, for no human liver could digest twelve pints of milk with the cream on it along with other food.

No more simple diet could be devised, for the vegetarian includes milk in his dietary, and reduces the pretext that because he does not eat beef or mutton he is a vegetarian to a mere farce. Neither beef, mutton, fish nor fowl is necessary for anyone, but the modern town-bred being considers he (or she) is "advāānced" because butchers' meat, as it is called, is not taken, and finds in the fact a subject for self-satisfaction, self-congratulation, and hugs him or her self in the belief that only they are physically clean or morally sound. Their diet, the food of more than half the universe at present, is but a reversion, only to be put a step further back by some that say they live on "nuts and raisins." So did an earlier type of being, but they lived up trees and had visible tails. All cults of this kind are but evidence of loss of touch with Nature, by people who know not Nature, who have "kultured" themselves into an artificiality of mind and body, and whose ignorance of life in natural surroundings is summed up in the "water-comes-from-cistern-and-milk-is-found-at-the-door school."

In the Tropics the vegetarian is the rule; he does not live on fruits, as some platform orators in this country tell us, but on cereals, with fruit as a mere and occasional adjunct.

Yet again do we find a people or peoples who do not drink milk. Cow's milk is not used by the Chinese either for their children or by adults; yet they seem to thrive and multiply so that they constitute one-fourth of the entire population of the globe.

We may well ask them, Where is the truth to be found in regard to diet? On what does it depend? The answer is, evidently, Environment; in other words, Nature. Mankind is but the product of the soil around him, but modern means of communication have modified this to a degree; inter-communication has increased the nature of his diet until we come to look upon foods unnatural to the soil as part of our daily necessity. We look upon rice, tapioca, wines, oranges, dates and other productions of warm climates as daily necessities, forgetting that they are artificial foods so far as the people in these islands are concerned. Even the potato is a recent introduction, sugar is in the same category, and so are cabbages, cauliflowers, and most of our vegetables. Now these commodities are artificial foods in the strict sense, and evidently are not necessities to Britons, for they throve before any of these were available. We may well ask what is our staple food; cereals and milk are really all that are absolutely essential, and if, in addition, we add eggs as included in natural products, we have a mixture of animal and vegetable food which gives our bodies all that they require without the use of animal food at all. There therefore need not be any prudery amongst those who call themselves vegetarians, for they accept this mixture of animal and vegetable sustenance as "theirs," a position they have no right to assume; yet do they proclaim their cult from the housetops, as do the teetotalers, who equally hug themselves because they do not take alcohol, which is again not necessary for anyone's existence, and forgone by the large majority of mankind.

The assumed super-civilization of folk who assertively declare themselves as either vegetarians or teetotalers is the product of minds who have lost touch with Nature, who are ignorant of the life of people who have not only not gone "back to Nature," but have never left it, and who continue to live upon the products of their environment, which Nature in her wisdom provided for them, and not upon the artificially introduced sustenance from foreign lands, or unnatural chemical compounds.

J. C.

Annotations.

Diagnosis of Thyroid Abscess.—Two signs (F. H. Lahey, *Boston Med. and Surg. Journ.*, January 18) are limitation of chin elevation and depression of the chin on the sternum when swallowing. These two signs, he believes, are of great significance in cases suspected of thyroid abscesses. They are brought about by the action of the sternohyoid, sternothyroid, and omohyoid muscles on the abscess beneath them. Pain results from tightening of these muscles, and this tightening as the result of swallowing may be prevented by depression of the chin on the sternum.

Prophylaxis of Infection with Schistosomum Japonicum (Y. Miyagawa, *Mitteilungen a. d. Fakultät der k. Univ.*, Tokyo, 1916, xv, No. 3).—If a lime-containing fertilizer is scattered systematically over a field and its watercourses, all the schistosoma eggs and the intermediate hosts will be destroyed. The eggs in stools mixed with urine and putrefying all die in two weeks in summer, and in sixteen days at other seasons. This fact makes it imperative not to deposit the egg-infested stools on open ground or allow them to get into running water. The most favourable conditions for the hatching out of these eggs is in running water.

Schede describes (*Mediz. Klin.*, xii, No. 50) an attack of botulism (*botulus* is Latin for "sausage") in a family of five members who ate from a raw ham. The pig had been slaughtered on the farm six months before. About eighteen hours afterward the symptoms of botulism became apparent in the mother and two boys of 10 and 12, and the woman and the older boy died; the other recovered. The father who had eaten most freely of the ham was not affected by the poisoning. The only gastro-intestinal disturbances were nausea and vomiting which the older boy suppressed. Extreme prostration, dryness of the mucous membrane, difficulty in swallowing and in speaking, diplopia, ptosis, absence of the knee-jerk, paresis of the bladder sphincter, and other symptoms indicating severe involvement of the motor and secretory regions in the medulla oblongata were the more striking manifestations until the respiration centre began to suffer. The two who died succumbed to arrest of respiration. Diphtheria antitoxin was given in two of the cases but without result; an antibotulism serum has been made, but it could not be procured for these cases. Pilocarpin has been recommended to combat the dryness of the mucous membranes, and Schede tried it in two cases but obtained alarming results, as it induced such profuse secretion of mucus in the air passages. He gave 0·01 gm. subcutaneously, but the boy nearly suffocated from the profuse secretion that followed in the air passages, which he was unable to cough up. With oxygen, heart and vessel tonics, and lowering the head, he was tided past this mishap. The tenacious constipation was combated with enemas, as drug purgatives might prove dangerous if they should be long retained owing to the vagus paralysis inducing the constipation. Lavage of the stomach is advocated, even long after the intoxication. On account of the paralysis of the stomach, scraps of the poisonous food may be washed out with the lavage days afterward. Emetics are liable to do harm on account of the paralysis of the swallowing muscles and loss of reflexes. Ample nourishment should be provided; it is best given through the stomach tube. Oxygen gave great relief to one patient. Potassium iodide, on account of its efficacy in a certain paralytic affection in cattle, was given to the boy that recovered, and it is certainly worth a trial in every case of sausage poisoning. *Bacillus botulinus* finds favourable conditions for its proliferation not only in ham and sausage, but also in canned beans, in herrings and the like. Canned goods should be cooked again before serving.

Community Treatment of Malaria (A. J. Ochsner, *Journ. Amer. Med. Assoc.*, March 17).—The treatment depends on certain well-known facts with regard to quinine which should be borne in mind:—

(1) Kills the adult *Plasmodium malariae*.

(2) Will not kill the plasmodium in spore form.

(3) Prevents spores from developing into adult forms.

(4) If given continuously, will consequently keep malaria spores in the body, which will later cause a recurrence.

(5) Must be absorbed in order to be effective, and kept constantly in the circulation, at least for forty-eight hours, in order to kill all plasmodia which belong to the one, two, and three day type.

(6) Taken by mouth will not be entirely eliminated in three hours.

(7) May all be eliminated in six hours.

(8) It is consequently necessary to give quinine *night* and *day* at sufficiently short intervals to keep fresh quinine in the blood for at least forty-eight hours continuously.

(9) The alimentary canal must be in a condition suitable to absorb quinine.

(10) Hot water in large quantities should be given with each dose in order to ensure solution and absorption.

(11) Its use should be completely interrupted for a sufficient interval after all adult plasmodia have been killed to permit the spores to develop sufficiently to be killed by quinine, but not long enough to permit new spores to form—that is, the interval should be less than seven days.

The treatment is applied, as a rule, not in absolutely latent cases, but in those with active symptoms.

Rules for Treatment.

(1) Give an exclusive diet of hot soup for ten days' treatment.

(2) On the evening of the first day give 2 oz. of castor oil in fruit juice or in beer foam.

(3) At 6 a.m. of the second day begin giving a 2-gr. capsule of quinine (preferably bisulphate) with cover taken off, with one-half pint of hot water, every two hours night and day for thirty doses, being absolutely sure not to miss a dose, in order to keep fresh quinine in the blood constantly. It is important to insist on waking the patient at night in order that the intervals shall not exceed two hours at any time.

(4) For the following six nights and five days give *absolutely no* quinine, but give a pill containing $\frac{1}{50}$ gr. of arsenious acid with one-half pint of hot water at 6, 9, 12, 3 and 6 o'clock.

(5) Give castor oil as in Rule 2 on the evening of the fifth day.

(6) At 6 a.m., following the sixth night, again begin to give 2 gr. of quinine precisely as under Rule 3.

(7) After that give general tonics and simple nourishing food.

(8) Avoid reinfection by the use of screens and remaining away from locations where infected mosquitoes abound.

Comment.

The errors usually committed lie in neglecting to give the quinine with no greater interval than two hours, especially at night.

Abstracts.

A CONTRIBUTION TO THE STUDY OF DYSENTERY.[1]

By A. C. Inman and D. G. Lillie.

Between November 3, 1916, and January 4, 1917, dysentery convalescents were admitted to the hospital direct from France.

Of 134 British cases 13 and of 21 Australian cases 5 were carrying *Entamœba histolytica* cysts.

Examination of the blood of these amœbic carriers revealed the fact that in 7 out of the 18 cases the blood serum agglutinated the *B. dysenteriæ* Flexner or the *B. dysenteriæ* Shiga in a dilution sufficiently high to warrant the diagnosis of a recent infection by one or other of these bacilli.[2]

This coincident finding of *Entamœba histolytica* cysts in the stools and specific agglutinating substances in the blood seemed sufficiently suggestive to warrant further observations on the point. To date we have had access to 97 carriers of *Entamœba histolytica* cysts invalided from France or Flanders as dysentery convalescents. The results obtained by examination of the blood are shown in Table II.

Table II.

Number of cases in which the blood agglutinated *B. Flexner*	26
Number of cases in which the blood agglutinated *B. Shiga*	7
Number of cases in which the blood failed to agglutinate either *B. Flexner* or *B. Shiga*	64

Of these 97 cases, 66 had never been with any other than the B.E.F., nor had they at any time previous to the War visited a country in which amœbic dysentery is known to be endemic. They must, then, have become carriers in France. In 38 of these 66 cases a history of contact with likely sources of infection was obtainable.

For sake of comparison it was decided to examine in a similar manner carriers of *Entamœba histolytica* cysts invalided from the Mediterranean area. The results obtained are set forth in Table III.

Table III.

Number of cases in which the blood agglutinated *B. Flexner*	5
Number of cases in which the blood agglutinated *B. Shiga*	28
Number of cases in which the blood failed to agglutinate either *B. Flexner* or *B. Shiga*	65

The percentage of positive and negative agglutination tests is identical with that obtained in the cases invalided from France. When, however, the cases with positive agglutination tests are considered, it is found that some 78 per cent. of the French cases are accounted for by the *B. Flexner*, whilst conversely over 80 per cent. of Mediterranean cases are accounted for by *B. Shiga*. Finally, amœbic carriers admitted to the hospital from the forces in India, Mesopotamia, and Egypt have been similarly examined. The results are exposed in Table IV:—

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[1] Abstracted from the *Lancet*, April 7, 1917.

[2] The agglutination test was carried out by Dreyer's method with Standard Cultures prepared in the Department of Pathology, University of Oxford.

TABLE IV.

Number of cases in which the blood agglutinated *B. Flexner*	1
Number of cases in which the blood agglutinated *B. Shiga*	3
Number of cases in which the blood failed to agglutinate either *B. Flexner* or *B. Shiga* ...	31 (88·5%)

The experiments referred to above are, in our opinion, suggestive from several points of view. For the reason, however, that they only form the beginning of a series of researches we do not propose, for the present, to go more deeply into matters than we have already done.

One conclusion of practical import may, however, be emphasized. It is highly important that careful protozoological as well as bacteriological and serological examinations be made in every case of dysentery coming under investigation. A positive bacteriological or serological finding, for example, does not preclude the necessity for a careful protozoological examination.

ON THE CULTIVATION OF THE MALARIAL PARASITE *IN VITRO*.[1]

By LEONARD S. DUDGEON and CECIL CLARKE.

THE paper embodies the results obtained from fifty-one cases of clinical malaria examined by means of the following technique:—

Technique.—Blood from a vein at the bend of the elbow was obtained either by direct puncture or by an all-glass syringe with large-bore needle. About 1 to 2 c.c. of blood was inoculated into 10 c.c. of normal saline with 1·5 per cent. of sodium citrate and glucose. At first the strengths of glucose used were 2 and 5 per cent., and later two other strengths, 7·5 and 10 per cent., were tried. After thorough mixing the tubes were incubated at 40° C. for twenty to twenty-four hours. Both aerobic and anaerobic methods were employed. Films were made from the uppermost layer of corpuscles, after the supernatant fluid had been pipetted off. Stained by the Giemsa method and examined by oil-immersion lens, the control films of fifty-one cases of clinical malaria showed:—

Malignant malaria (ring forms and crescents or crescents only)	18
Benign tertian	12
Quartan	1
Malaria, type undetermined	10
No malarial parasites	10

CULTURE.

	Increase of parasites			Totals	
	Marked	Not marked	Undetermined	Positive	Negative
Malignant malaria ...	11 ...	1 ...	2 ...	14 ...	4
Benign tertian ...	0 ...	0 ...	1 ...	1 ...	12
Malaria, ? type ...	4 ...	0 ...	3 ...	7 ...	3
Films negative ...	— ...	2 ...	1 ...	5 ...	5
	17	3	7	27	24

Evidence of Increase of Parasites.—Using this medium, a diluted plasma with the addition of dextrose, the characteristic form which can be recognized as a plasmodium is what is termed here the "dot" form. In size it is smaller than the fine ring, the nucleus staining as a bright-red dot and the protoplasm an intense blue, semilunar in shape. The appearance suggests the merozoite. Typical ring forms were infrequent. Although the "dot" form appears free in many of the films, yet in fortunate films they are seen to be intracorpuscular, and it is probable that in the spreading of the films the fragile envelope of the incubated red corpuscle is damaged. No comparative enumerations of parasites were attempted.

Remarks.—In seventeen cases (all of which were undoubtedly malignant malaria) the terms "abundant," "very numerous" are employed to indicate the number of "dot" forms present. The mere words do not adequately convey to the mind the relative ease with which parasites are to be found in the films as compared with the original control film. Of eighteen cases of malignant malaria investigated only four gave a completely negative result in culture. On the other hand, no increase of parasites could be demonstrated in twelve cases of benign tertian and in one of quartan infection. Of ten cases of malaria of undetermined type the culture was negative in three. Of ten cases, nine of clinical malaria and one of jaundice, in which the control blood films after adequate examination were considered negative, "dot" forms were found in five. In two instances they were abundant.

Our statement that no parasites were found was the result of prolonged examination of blood films. The whole question, however, of the number of parasites present in blood is dealt with in detail by Sir Ronald Ross in his text-book on the "Prevention of Malaria" (1911), but one sentence can be quoted from this work as follows: "But for a broad general rule we may, I think, accept the principle (pending more exact researches) that if we cannot find the parasites after careful search their number is not usually sufficient to produce fever."

The possibilities of this technique are confined to aiding clinical diagnosis.

Blood incubated in citrated broth, but without the addition of dextrose, did not permit of the development of the "dot" forms in the culture tubes. The citrated plasma medium with dextrose may be said to permit of concentration of, and life of, the plasmodium for a period of twenty-four hours or more, while with Bass's medium the patient's serum with dextrose permits of concentration plus life plus development of the plasmodium.

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[1] Abstracted from the *Lancet*, April 7, 1917.

Whether the true explanation of the results is an apparent or a real increase of parasites in the intermediate layer or both the evidence permits of no dogmatic opinion.

Conditions of Growth.—The favourable conditions of growth are three:—

(1) The presence of dextrose in the medium is essential. Bass and Johns [1], in October, 1912, published their discovery of this important factor. Further, they found that maltose alone of many carbohydrates tried—e.g., saccharose, lactose, galactose, dextrine, mannite—could replace dextrose.

In our experiments strengths of dextrose varying from 2 per cent. to 10 per cent. were tried, and the best results obtained in the 5 and 7·5 per cent. solution. At variance with this conclusion is the recommendation of Bass, as to the strength of dextrose, in his second publication. Bass, using undiluted human serum as the culture medium, added dextrose in such quantity that the final mixture contained 0·5 per cent. dextrose. The successful results obtained by Bass and Johns have been confirmed.

(2) Bass in his original paper emphasized the importance of strict *anaerobiosis*, but in the second publication the technique recommended does not necessitate anaerobic cultivation. Whether the employment of glucose in the medium secures anaerobiosis or no, certain it is that, using both anaerobic and aerobic methods, we achieved precisely the same results. The red corpuscles by reason of their avidity for oxygen seem to remove the oxygen from the fluid medium and so contribute to the maintenance of an anaerobic state.

(3) The optimum *temperature* is given as 40° C. Bass noted the segmentation of æstivo-autumnal parasites from the smallest rings in about thirty hours at 40° C., and that the parasite will develop, but more slowly, at any temperature between 37° and 40° C. In this series all cultures were incubated at 40° C.

Attempts to cultivate the benign tertian parasite have with this technique so far met with no success. How different is the case of the malignant parasite which can live and develop partially in an unfavourable culture medium! Now, as Bass has grown the three malarial parasites, a comparison of the two methods, based as yet on a small number of cases, is fitting.

The literature of this subject is limited to two papers. Bass and Johns [1] have recorded that they successfully cultivated the æstivo-autumnal parasite from each of twenty-nine different patients and the benign tertian parasite six times. One case of quartan was tested, but the parasites failed to grow. The lack of success was ascribed to certain errors of technique: "It is to be remembered that one of us (Bass) obtained growth of the quartan parasite in his earlier work."

Thomson and McLellan [2], employing Bass's method, but incubating at the lower temperature of 38° C., were able to cultivate the malignant parasite from two patients. The development of the plasmodium through one generation was followed. Sir Ronald Ross was convinced, after examining the preparations of Bass and Thomson and McLellan, that the evidence of the successful cultivation of *Plasmodium falciparum* up to the sporulating forms was indisputable.

Bass's Original Technique.—One-tenth of a cubic centimetre of a 50 per cent. dextrose solution (Merck's) for each 10 c.c. of blood to be taken is placed in the defibrinating tube before the blood is drawn. Defibrination is effected by gently stirring or whipping with the rod which extends through the wool plug. The whipping in of air, causing bubbles, must be avoided. The defibrinated dextrose blood, sufficient in amount to ensure of a depth of serum one-half to one inch above the red cells when the latter have settled, is transferred to two culture tubes and incubated at 40° C. The parasites may be examined at any interval by drawing a small quantity of cells from the intermediate layer by means of a capillary tube. Fine capillary tubes should not be used as the infected red cells may be damaged. Great care must be taken in handling tubes to keep them in the upright position. To defibrinate the blood we used a bundle of stiff wire twigs attached to a glass rod extending through the wool plug.

Remarks.—The material at our disposal during the last six weeks has been principally the benign tertian parasite. Nine cases have been examined by Bass's method, four of which have given a completely negative result. These latter cases had received doses of quinine in liquid form of 20, 40, 20, 20 gr. respectively. In two instances the control film at the time of hæmoculture was negative. The five patients from whom positive cultures were obtained had received respectively the following amounts of quinine—0, 0, 5, 15, 10 gr. The parasite developed typically for 15, 45, 18, 17, 12 hours. Increase in the number of parasites, as judged by a comparison of the control film with the culture film, was noted in three instances. In the remaining two positive results the parasites were plentiful. Development up to segmentation was seen in two cultures.

Employing the citrated plasma medium, negative results were obtained in six cases of benign tertian infection. One case of quartan malaria continued its development up to the formation of merozoites. Increase of parasites was noted. Three other negative results were recorded. In two the control films showed a few crescents but no ring forms. In the third case there were a few fine ring forms. This patient had been given 40 gr. of quinine during the preceding twenty-four hours. The remaining positive result is of interest. The patient had been taking 10 gr. of quinine daily in tabloid form since leaving hospital in September, 1916. The control film showed scanty fine ring parasites with nucleus and vacuole, but no crescents. Development was followed for thirty-eight hours with the appearance of the malignant parasite in culture. The number of parasites was much increased, and there was a tendency, as noted by others, for the parasites to collect in groups. In the citrated plasma medium numerous "dot" forms were found at twenty-four hours. Fine ring forms were also seen.

The Influence of Quinine in Culture.—It seems certain that the presence of quinine in the serum used in the culture medium influences the development of the plasmodium, the benign tertian parasite especially, *in vitro*.

In the living body a marked diminution in the number of benign tertian parasites from the peripheral blood within twelve to twenty-four hours of the giving of quinine in doses of 15 to 20 gr. is observed commonly. Quinine given in fluid form by the mouth can be demonstrated in the urine after half-an-hour's interval, and by the end of forty-eight hours the greater part has been excreted chiefly by the urine and to a less extent by the sweat and bile. Clearly, then, the actual serum used for the culture medium will, if the drug has been administered recently, contain a certain amount of quinine.

The exact manner in which quinine exerts its destructive influence is still largely a matter of speculation. Thomson and McLellan [2] noted incomplete segmentation of the æstivo-autumnal parasite obtained from a patient who had been taking 5 gr. habitually. A parasite of the same species recovered from another patient who had not taken quinine grew abundantly. Bass does not mention the influence of quinine in his cultures.

SUMMARY.

The material embodied in the first portion of this paper, based on fifty-one cases, is probably large enough to admit of certain statements. Cases of clinical malaria in which the blood films were negative have been confirmed by cultural methods. Of ten patients whose control blood films after careful examination were considered as negative, "dot" forms were found in five cultures. The two tertian parasites behave differently in culture. Of nineteen cases of malignant malaria, four only gave completely negative results in the citrate plasma medium, while seventeen cases of the benign tertian parasite failed to grow under the same conditions. As a corollary of this, where film examinations are inconclusive as to the type of parasite, a positive culture in this medium points to malignant infection. The employment of this medium as a routine in hæmoculture may prove to be of value in assisting and confirming a clinical diagnosis.

If with improvement of technique on the lines of Bass's method the cultivation of all three varieties of the malarial parasite can be made certain and permit of exact study, a step will have been made towards solving some of the many problems of malaria awaiting solution.

REFERENCES.

[1] BASS, C. C., and FOSTER, M. JOHNS: *Journ. of Exp. Med.*, October, 1912, xvi, 567.

[2] THOMSON, J. G., and MCLELLAN, S. W.; *Ann. Trop. Med. and Parasit.*, December, 1912, vi, 449.

ALKALINE TREATMENT OF EARLY GALL-BLADDER CARRIERS.[1]

By HENRY J. NICHOLS, M.D.

GALL-BLADDER carriers include carriers of the typhoid group, cholera carriers, and probably also bacillary dysentery carriers. The common duct fistula method in rabbits shows that more typhoid bacilli appear in the bile with larger intravenous doses; that more bacilli appear after mesenteric than after ear vein injections; that more bacilli appear in immunized animals than in normal animals, and that more actual gall-bladder infections occur under these conditions, which favour the presence of micro-organisms in the bile, than otherwise.

In experimental typhoid gall-bladder lesions in the rabbit, section of the gall-bladder wall shows an infiltration with round cells only immediately underneath the mucous membrane where the influence of the infected bile is first exerted. No foci of infection are found in the wall of the bladder, and no peritonitis is present. The bladder is often ballooned out with a very thin transparent wall.

Under these circumstances it is indicated to direct early therapeutic efforts to the bile rather than to the blood or tissues. In the experimental work, while human bile and ox bile generally favours the growth of typhoid bacilli, rabbit and guinea-pig bile kill off all bacilli in twenty-four hours. This effect was first noted with bile from a common duct fistula. It is not so definite, especially in case of the rabbit, with bile from the gall-bladder, which is less alkaline, and contains more solids than bile directly from the liver. This antiseptic action was found to be due largely to the alkalinity of the bile, because it disappears on neutralization. This finding suggested that alkaline treatment might be of value in the treatment especially of incipient carriers. The reaction of the bile can be influenced by the administration of alkalies. It was found that sodium bicarbonate injected intravenously made rabbit bile more alkaline. In man the same thing is apparently true, as evidenced by the following experiment: The duodenal contents of a normal person were titrated, with a result that 5·4 c.c. of normal sodium hydroxide were required to neutralize 100 c.c. to phenolpthalein. The subject was then put on a daily dose of 6 grm. of sodium bicarbonate; at the end of a week the duodenal contents were again titrated, and only 1·2 c.c. of normal sodium hydroxide were required to neutralize 100 c.c. The urine became neutral on the fourth day. Such tests should preferably be made in cases of biliary fistula, because in the duodenum the bile may be mixed with gastric and pancreatic fluid; but it seems reasonable that the result would be qualitatively the same.

THE DETECTION OF GALL-BLADDER CARRIERS BY AID OF THE DUODENAL TUBE.

While much advance has been made by the examination of fæces, the examination of the duodenal contents marks an advance over any enrichment medium for the fæces. The detection of typhoid bacilli in the fæces shows that this method is not altogether satisfactory, and a concrete example is found in the fact that the duodenal contents of early carriers may contain typhoid and paratyphoid bacilli, while repeated examination of the fæces fails to reveal them.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, March 31, 1917.

Technique.—A regular breakfast is allowed at 7 o'clock; in about two hours the metallic sinker is chilled in ice water and is put in the mouth with the patient sitting up in bed, and a small drink of water is given; as soon as the patient swallows the sinker he lies down on the right side and waits for the tube to descend to the duodenum (third mark). On an average a wait of about four or five hours was necessary. At the end of three hours the tube is aspirated with a syringe, which usually produces a small amount of whitish mucus, acid to litmus. This procedure often establishes a siphon, and in another hour yellowish-green fluid, neutral or alkaline to litmus, may be dropping out of the tube. Further suction gives from 10 to 20 c.c. of genuine duodenal contents. If the contents are still acid, a further wait is necessary, and rarely another trial on another day must be made. No special hardship is involved, and one patient took the tube four times. Altogether twenty-eight successful attempts were made out of thirty-two trials on twenty-five patients. Endo plates are inoculated as soon as possible, one with the straight fluid and one with the centrifugate. Another portion is put in brilliant green peptone water, 1:200,000, and plated on Endo's medium after twenty-four hours' incubation. The centrifugate is also examined microscopically for organisms, crystals and cells. In one case many active *Lambliæ intestinales* were recovered, while the stool showed only a few cysts.

In general, the contents in all cases were much the same, consisting of a yellowish-green, mucoid, slightly turbid liquid, neutral or slightly alkaline to litmus. The specimen, therefore, differs from the thick brown fluid obtained from a biliary fistula, but the change in appearance is apparently due largely to dilution, which does not affect its suitability for culture. In the centrifugate amorphous débris predominates, a few cholesterin crystals are occasionally seen, and also yeasts, cocci and motile bacilli, which culture shows are usually colon bacilli. The two positive cases showed no distinct macroscopic or microscopic evidences of infection, although carriers of longer standing would probably show some pus cells.

It so happened that, in the two positive cases, examination of the duodenal contents also furnished a diagnosis which could not have been made otherwise with certainty. Both patients were admitted late in their fevers, blood cultures and stool cultures were negative, and agglutinations did not furnish much information, as the patients had both been vaccinated with typhoid vaccine and gave a good reaction for typhoid, while *paratyphoid* A agglutinations are weak even in infected persons. In one case *paratyphoid* A bacilli were found in considerable numbers, and, in the other, typhoid bacilli. The latter patient soon developed a typical typhoid relapse.

ALKALINE TREATMENT.

CASE 1.—*Paratyphoid* A *Carrier.*—Man, aged 26, was admitted to hospital October 10, 1916, with a temperature of 103° F. and a history of fifteen days' fever in Mexico. Blood cultures and fæces culture were negative, October 11. Typhoid prophylaxis had been given in 1911 and 1914. The temperature became normal October 14. October 30 duodenal contents were obtained, and a large number of suspicious colonies were found on the Endo plates, which proved to be those of *paratyphoid* A bacilli. The contents were slightly alkaline. The patient was put on 2 grm. of sodium bicarbonate, three times a day, for ten days. The urine became alkaline in three days. Second examination of the duodenal contents was negative November 14. The bile was definitely alkaline to litmus. The fæces examination was negative eight times during the treatment, and was strongly positive once. The urine was negative twice.

CASE 2.—*Typhoid Carrier.*—Man, aged 20, was admitted, November 3, with a temperature of 104° F. and a history of fever for one week. Blood cultures and stool culture were negative November 4 and 5. Typhoid prophylaxis had been given in July, 1916. The temperature was normal November 13. November 15 a duodenal tube was passed, and the contents showed typhoid bacilli in a brilliant green sample; the direct plate was accidentally dropped and lost. The contents were neutral. There was a relapse from November 18 to December 10. Sodium bicarbonate, 2 grm., three times a day, was given November 19-28. Second bile test, December 21, was negative. The fæces examination was negative six times, and the urine negative once.

In brief, both these early carriers were negative on a second examination of duodenal contents after a course of sodium bicarbonate. They may have been simply temporary carriers and might have cleared up of themselves. On the other hand, they might have become permanent carriers. In the *paratyphoid* A case a suggestive finding occurred; the stools were negative except on one examination, which showed a large number of colonies. This result may have been in the nature of a "provocative" reaction due to washing out of a plug of infected mucus.

COMMENT.

The superiority of examination of duodenal contents over that of the fæces for the detection of carriers is, of course, to be expected theoretically, and seems to be strongly indicated by the few cases so far examined. Whether the bacilli are constantly or only intermittently present in the duodenal contents of a carrier will have to be determined by further work; the chances favour the former possibility; but if bacilli are only intermittently discharged, the gall-bladder may be stimulated to contract during the examination by a preliminary meal.

The number of permanent carriers of typhoid bacilli is usually put at about 3 per cent. of cases, while temporary carriers run much higher, depending on the time of examination. Examination of the duodenal contents may increase the percentages for both kinds of carriers, but especially for temporary carriers. In this connection a practical point is the proper time after recovery for examination, because the bile always contains typhoid group bacilli at some period of the disease. Probably at least a month should pass after the temperature is normal before the test is made, in order to avoid picking up the purely temporary carriers which clear up of themselves.

The importance of the detection of carriers of the typhoid group has been generally recognized in our military service, and two negative fæces and urine examinations are required before discharge. In civil life the same is hardly true as yet, and the traditional view that welfare of the individual patient is the end-all of the physician's duty still has force. In the service and in public health work generally, in which a medical officer is charged with preserving the health of large numbers of persons, the more modern views of preventive medicine and social welfare are perhaps more in evidence. The individual, of course, must still remain the unit of attention, but many possible cases have claims as well as the one actual case. A concrete example is found in the possible spread of *paratyphoid* A infections as a result of the present mobilization. As we now know, this disease is far from rare in Mexico and on the border, and a number of cases have occurred in the troops, as will later be reported by medical officers. Fortunately the disease was promptly stopped by vaccination, and the convalescents have been examined for carriers, but it should be recognized that these measures are distinctly recent and are due to modern broad conceptions of medical work.

In regard to the alkaline treatment of early carriers, the work so far done is largely preliminary; only two cases have been treated, and they were not of a decisive character. The object of this article is to call attention to the importance of realizing the pathogenesis of the carrier condition and of appreciating the possibilities of early treatment through the bile. As in many other conditions, much more may be accomplished early than late. No opportunity has yet presented itself for the treatment of a chronic carrier, but the conditions here would seem to be more difficult. Vaccination seems to have cured some cases and in others surgical intervention has been tried successfully when vaccine failed. Again, removal of the gall-bladder is not always successful, as the bile passages may be infected. The chances of curing a well-established lesion by simple measures certainly do not seem as good as they may be in early lesions. The reasons for trying to cure early carriers through influencing the reaction of the bile are: The bile is first and always infected; it spontaneously frees itself from infection in most cases by its antiseptic action; the antiseptic action is largely dependent on its alkaline reaction, and the reaction of bile can be made more alkaline by appropriate means. In case of a combined gall-bladder and urinary bladder carrier, the case would, of course, require separate lines of treatment, one alkaline and the other acid. Many other factors, such as the effect of the infection itself on the reaction of the bile, the extent to which the reaction can be changed, and the amount of alkali required remain to be determined.

SUMMARY.

(1) The mechanism of gall-bladder infection in the typhoid group, cholera and bacillary dysentery is by descending infection of the bile from the liver and not by emboli in the gall-bladder wall.

(2) Alkalinity of the bile favours its antiseptic action, and the reaction of the bile can be effected by the administration of alkalies.

(3) The detection of early gall-bladder carriers by examination of the duodenal contents is a more reliable and simpler method than examination of the fæces.

(4) Alkaline treatment is suggested for early gall-bladder carriers.

Reviews.

STUDIES IN MALARIA. By Hugh Stott, M.B., B.S.Lond., Captain I.M.S. In five parts. Calcutta and Simla: Thacker, Spink and Co. 1916. Rupees 7-8.

The author is to be complimented on a considerable amount of painstaking work and originality of observation. He specially has devoted himself to the consideration of the marked difference of the incidence of malaria under varying conditions and the prophylactic use of quinine. The value of well-kept temperature charts, clinical observations, and laboratory work on malarial blood is borne out. The subject of the administration of quinine by mouth and injections is fully dealt with. The work on salvarsan should be carefully considered by all who feel disposed to adventure on its administration in malaria. The observations on the effect of malaria remaining and producing symptoms on those who are invalided is a masterly exposition on the subject.

AN INDEX OF SYMPTOMS WITH DIAGNOSTIC METHODS. By Ralph Winnington Leftwich, M.D. Sixth Edition. London: Smith, Elder and Co., 15, Waterloo Place. 1917.

A very pleasant help in case of need, both in the treatment of patients, and quite invaluable during the perusal of modern literature. The author has prepared by far the best list known to us of symptoms to which the names of individuals are attached. They are arranged alphabetically, and by reference to the body of the work the disease dealt with is much more easily understood. The advantage of such a list is only appreciated after its perusal.

Original Communications.

THREE CASES OF VENEREAL GRANULOMA TREATED WITH TARTAR EMETIC.

By C. Bonne, M.B.

(From the Hospital in Paramaribo, Surinam, South America.)

In Surinam, venereal granuloma, also called granuloma of the pudenda, is not a very prevalent disease, and in the course of a year only a few patients who contract it enter the hospital in Paramaribo. For years the routine treatment has been excision or cauterization, but the general experience was that after a shorter or longer time the ulcerations reappeared. As a rule the disease does not affect the general health of the patient for a long time, not even in those cases where the granulations invade the rectum or the vulva, or where considerable destruction of the penis takes place. But it can become very painful, and nearly always the patient is seriously depressed by his horrible and nearly incurable sores.

Stimulated by the good results obtained in Brazil with intravenous injections of tartar emetic, I proposed to Dr. v. Konigslow of the Paramaribo Hospital to try this treatment on one of his patients, a Javanese woman, with an inoperable venereal granuloma extending into rectum and vagina. The septum between vagina and urethra was partly destroyed, and the woman actually passed the urine into the vagina. Of both labia majora the skin on the outer side and the mucous membrane on the inner side were involved by granulomatous tissue. Part of one of the labia was elephantoid. The patient had been in the hospital for longer than a year, and had been treated locally with cauterization, ointments, &c., without any permanent benefit.

The injections of tartar emetic were given in several places wherever the very small veins, which she unfortunately happened to have, could be made visible, the solution containing 1 mg. of tartar emetic in 1 c.c. of normal saline. In the first injection 60 c.c. were given containing 60 mg. of the drug; it was preceded by 50 c.c. of normal saline, and the last traces of tartar emetic were washed out of the apparatus by another 50 c.c. The tartar emetic cannot reach the subcutaneous tissue in this way, if only good care is taken that the point of the needle is in the lumen of the vein. If this condition is fulfilled, the patient does not complain of pain either during or after the injection.

The patient stood this first injection well, and after four days a second one was given of 150 c.c., followed by eight injections each of 150 c.c. at intervals of four to seven days, partly given by Dr. Konigslow, partly by myself. Already after the fourth injection the condition was improved, and after the tenth the granulomatous tissues were replaced by healthy epithelium. The woman did not get back a normal urethra and a normal vagina, of course, and also the elephantoid thickening of the labium had not disappeared, although it had diminished in size. There was still a slight mucopurulent discharge from the vulva, kept up by the abnormal passage of the urine, but the granuloma had disappeared.

This excellent result made me try the method on a second patient, a Javanese immigrant, who also had been in the hospital for a very long time with a venereal granuloma extending from the coccygeal region to the scrotum and invading the rectum. It had been excised and cauterized repeatedly even with the actual cautery, but it had always returned. The man was in a very feeble state, could not sit up in his bed for pain, and was in a deplorable condition.

I started the injections twice a week, the first time with 80 c.c., later on with 150 c.c. of the tartar emetic solution for three weeks, then continued once a week with 150 c.c. till ten injections were given. At irregular intervals a further four injections were administered, the last two of which contained 200 mg. (3 gr.) of the drug. The veins of the arms could always be used.

Very soon the ulceration began to dry up and to be replaced by healthy skin. The pain disappeared, too, and the patient, whose language I did not understand, used to demonstrate his joy by sitting up in his bed and jumping up and down on his buttocks. This means something for a phlegmatic Javanese. The general health of the patient showed marked improvement.

The third patient was a patient of Dr. Verhagen of the Paramaribo Hospital, with a relatively small patch of typical venereal granuloma in his left inguinal region. Four injections—one of 100, two of 150, and one of 175 mg. of tartar emetic—were sufficient to cure this patient. They were given by Dr. Verhagen and myself.

The results obtained, particularly with the first two patients, for whom there was no other hope left than to stay in the hospital for the rest of their life, and who were actually cured in the course of a few months, clearly show the specific action of tartar emetic on the still insufficiently known causative agent of venereal granuloma. I can most strongly recommend this method of treatment to everyone who is working in a tropical country where venereal granuloma is endemic. The patients stand the injections, if rightly administered, quite well, the only symptoms caused by them being slight coughing at the end of the injection and a small rise of temperature on the same or the next day, which occurs occasionally, and which probably can be avoided, since it does not follow each injection.

The treatment was started in Brazil by Beaurepaire Aragao and Vianna in 1913. In the Albert Dock Hospital in London, Low and Newham treated a case on these lines with good results, particulars of which can be found in the *British Medical Journal*, September 16, 1916, p. 387. Our knowledge is still very imperfect on an important point, viz., the possibility and frequency of relapses after the tartar emetic treatment. Dr. de Souza Aranjo in Rio de Janeiro reports three relapses in twenty-five cases treated by the tartar emetic method. A review of his thesis is to be found in the *British Medical Journal*, July 29, 1916, p. 146.

A CASE OF RECURRENT BILHARZIOSIS.

By J. L. Potts.
Gonville and Caius College.

Private K., South African R.E., while living in Northern Transvaal, became infected with *Schistosomum (Bilharzia) hæmatobium* in June, 1912, at the age of 14.

The first symptom was pain in the kidneys, most marked when lying down. This was followed by hæmaturia and pain on micturition. The attack lasted for three months, and then, as is common at the time of puberty, the symptoms completely disappeared.

In November, 1916, the patient came from Africa to England, and in March, 1917, had a recurrence of symptoms, renal pains, hæmaturia, and pain on micturition.

This, as there is no reason for supposing that the patient was not completely cured of his first attack four and a half years before, and as he frequently bathed in the rivers, gives an incubation period of five months.

Examination of patient's urine showed the presence of ova, with terminal spines, from which the *Bilharzia miricidia* were hatched out.

An examination of the blood gave:—

Hæmoglobin percentage	81	
Red count	6,254,000	per cubic mm.
White count	8,300	per cubic mm.
Colour index	0·6656	
Differential leucocyte count:		
Polynuclear	47·4	per cent.
Eosinophils	9·4	,,
Large mononuclear	4·7	,,
Lymphocytes	37·5	,,
Mast cells	·7	,,

This brings out the characteristic eosinophilia, there being an increase of eosinophile cells of 6 per cent. above the normal. Also, there is a very slight increase of large mononuclear leucocytes, which is sometimes found in cases of "Bilharzia" infection.

An unusual feature of the count appears to be the considerable fall in the number of polynuclear cells and the increase in the number of lymphocytes.

◆

Rinderpest: Preparation of Antiserum. By A. W. Shilston, Agricultural Research Institute, Pusa. Calcutta Government Press. 1916. 4d.—The interval between the injection of rinderpest blood and nitrate solution, and the first bleeding for serum in hyper-immune animals can be reduced to eight days. By three bleedings at the rate of 6 c.c. per lb. body weight on the 8th, 12th, and 16th days, a mixed serum is obtained of equal or increased potency to that obtained by two bleedings fifteen and seventeen days after injection at the rate of 6 c.c. per lb. body weight. The actual yield of serum after injection is increased from 6·79 c.c. per lb. body weight by two bleedings system to 9·6 c.c. by three bleedings system; an additional 2·81 c.c. of serum per lb. body weight; an increase of 41·4 per cent. of the output.

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THE JOURNAL OF
Tropical Medicine and Hygiene
May 15, 1917.

THE MIXING OF RACES.

That the barriers between peoples must be broken down and intercommunal life encouraged, is a favourite theme of the so-called Socialist of to-day. Not only are the grades of society to be abolished, but the distinction of colour set aside also, so that there shall be intermarriages between peoples irrespective of race, colour and creed. This is the advanced idea of a few thinkers, or, shall we say, of men and women who have allowed their ultra psychology to roam into the realms of fancy until their judgment is overreached by flights of mental aberration.

This intermingling of species of human kind is better known to British folk in the Tropics than to any other section of the world's communities. The Eurasians of the Asiatic continent, the half-breeds of America, and the swarthy types of several lands, European, African, and American, are examples of the effects of intermarriage between white, yellow, red and black peoples which is becoming more and more pronounced in numbers and in the part they play in the world's affairs. Is this to the advantage of the world's future? or is it a setback and reversion of Nature's plan? are questions of immense importance and daily becoming more so. Stifle the subject as we may, throw a veil ever so thick over the origin and causes of the mixed products of mankind, there are the facts before us. Millions of people of mixed blood are on the world's surface to-day, and with the advance of equality notions the numbers will tend to increase instead of diminish as time progresses. We have, therefore, to accept the fact, to realize the increase of such peoples, and to consider the pros and cons of the situation. Knowing the origin of the types, it is held to be a subject to be avoided and glossed over with all the politeness and delicacy of thought and manner at our command. This may be considered good manners, and done out of consideration for the feelings of people who are not responsible for their parentage, and so forth; but it does not settle the question, nor does it satisfy the physiologist, the student of ethnography, nor the pan-humanitarianist. Why obscure the origin of these mixed races? It came about in accordance with Nature's laws of increasing and multiplying upon the face of the earth. The European in his search for food, raiment, and so-called luxuries had to travel afar, now to the East, now to the West, Northwards to the Arctic, Southwards to the Equator, and far beyond the Equator to lands discovered but yesterday. The men went, the women could not; the voyages were long, residence meant not a few weeks but years, sometimes many decades, sometimes for a lifetime. Nature's law that "it was not good for man to be alone" holds good for all time, and that a white man should take a wife from amongst the people he lived with was to be expected. Modifications of this, the initial reason of the mixture of species, may not be the rule to-day—other times, other causes; but the primary start followed a natural law, be the modern development what it may. The East and West Indies were far away in the days when ships were small, sailings rare, and intercommunication was anything but the time-table life of to-day. Exiles in truth were these pioneers, and in consequence local marriage affinities multiplied and a mixed population grew apace.

It is perhaps useless to go far back in this inquiry, to attempt, for instance, to gauge what effects the exploitation of the Mediterranean littoral had in mixing the blood of different races in the population of the Republic of Venice, to estimate the effect of the contact of Rome with the races on the North African shore, the presence of the Moors from Africa upon the Spanish people, and the consequences of the world-wide spread of the Portuguese throughout many tropical countries upon the home population. In more recent times we see on a large scale the consequences of the contact of the negro with the white population of the United States of America; the presence of a distinct Eurasian people in India and the Far East, the result of contact of the British with the peoples of India and China; of such people as the Goanese and of the inhabitants of Macao with Portuguese. The largest admixture, however, is the present population of the South American Continent, where admixture is widespread.

The presence of these mixed-blood peoples is a growing factor in many countries, therefore it is not in any sense a negligible one. That they will increase in numbers is inevitable, for they are prolific to a degree and capable in many ways. In several spheres they have contributed to the ranks of science and art, and in commercial circles they play an important part. We find amongst them poets and musicians of note; they are artistic to a degree in many instances; as doctors and barristers some are eminent; and in many fields they hold their own with the pure-bred peoples from which they spring. Their devotion to work, their gentle manners, and their amiability, are examples for others to follow. They are clever in many ways, capable of acquiring knowledge rapidly and easily, and as a rule socially agreeable. These are qualities which give them a distinct and important place in the world, and as time advances and their sphere of opportunity widens they will become more important still. The three qualities required to attain greatness amongst a people are said to be: diplomatic ability, military qualities, and commercial integrity. In not a few instances these have been shown, but in the nature of things opportunity is lacking, for few mixed-blood peoples have been called upon, except in Mexico, South America and South Africa, to show their true power in these directions, and even in these to but a limited extent in what may be termed the highest spheres of world influence. That they will fall short when called upon to do so is by no means to be taken for granted; in fact, the opposite is possible, nay probable, judging from their attainments.

There are other factors in vogue, however, that are against race-blending. Setting aside the language question, we have the matter of religion as an obstacle. The Mahommedan is exclusive in the matter of intermarriage, and even in Europe the question of Greek Church, Roman Catholic, and Protestant forms of worship and Church government keep people apart in a way which is as potent as nationality, and raises a barrier to intermarriage. That the brotherhood of mankind is possible under these circumstances, in the sense of toleration without prejudice, is not to be brought about in our day, if ever. That it will gather ground is possible, perhaps inevitable; that mixed-blood peoples will inherit the earth if the process advances as it has done during the last century or two, is a contingency with possibilities to be thought of, seeing the social intercourse in the modern world owing to facile travel and a universality of literature.

That there are those who have set themselves against a mixed-blood population we have no better illustration than that of Australia, where a "White Australia" is the motto. That they are right in principle no man can gainsay; that they are right from a commercial point of view is another matter so far as the rapid development of the country is concerned. It is, however, from a racial point of view the only plan to follow; for they have set an example, which will no doubt play an important part in contributing to show those who advocate intermixture of races as the only plan of bringing about a universality of peoples, possessing a common object in the ultimate hope of doing away with nationality, with wars, rivalries and jealousies, which by them are regarded as the obstacles to procuring peace on earth and goodwill amongst men, that it is a Utopian idea, and not a probable solution of the question.

Annotations.

The Blood in Leprosy.—S. de Buen (*Siglo Medico*, February 10 and 17) examined the blood of thirty-six lepers. No special leucocyte formula could be discovered, and eosinophilia was not common. Mononucleosis was frequent, and Arneth's index was displaced toward the left, but no data of importance could be deduced from the red or white count.

Spirochæte Bronchitis.—B. Galli-Valerio (*Correspondenz-Blatt für Schweizer Aerzte*, February 10) mentions sixteen different maladies in which spirochætes have been found, and in some were regarded as responsible for the affection. Spirochæte bronchitis has been encountered in Asia, Europe, and elsewhere, seven cases at Lausanne, since Castellani called attention to it. The prognosis is favourable if the treatment is energetic enough to arrest the disease before it has passed into a chronic phase. Microscopic examination of the stained sputum reveals the spirochætes; seven patients had been diagnosed tuberculous. Treatment was bed rest, keeping up the patient's strength and giving arsenic, merely Fowler's solution by the mouth or intramuscular injection of some mixture containing sodium cacodylate. Salvarsan is recommended. The disease runs an acute course in five or six days, with high fever and profuse expectoration of a whitish or yellowish sputum. Percussion is practically negative, and auscultation reveals merely disseminated râles. Headache and pains in the limbs, reduction in hæmoglobin and reds, with manifest leucocytosis, are other features. The chronic form shows a hectic fever, deceptively like that of tuberculosis, with chronic cough and expectoration and sometimes actual hæmoptysis, with much weakness and anæmia. Untreated, it may drag along for years with intervals of improvement.

A Warning against Trichinosis.—The American federal meat inspectors do not inspect pork or pork products to determine the presence or absence of the organisms causing trichinosis, as even careful microscopic examination is unreliable. They do require, in establishments under their supervision, that pork that is to be made into products to be eaten raw shall be heated or subjected to extreme cold so as to destroy such organisms, but as federal inspection covers only establishments engaged in inter-State commerce, it is not safe to rely on it altogether. Even such products should be avoided unless they are known to have come from establishments under federal or equivalent inspection. In fact, the Bureau of Animal Industry, United States Department of Agriculture, in a warning just issued against the danger in raw pork, gives no countenance to its use as an article of diet, but emphatically sets forth that the safest plan is to eat no pork products of any kind raw. According to the Bureau, the records show that the number of cases of trichinosis increases during the holidays, partly because of hog-killing time, and partly because farmers frequently make up special forms of sausage which are eaten without cooking. The rule of safety laid down by the Bureau is to cook pork until it has lost its red colour throughout all portions, or, if a trace of this colour is still present, at least until the fluids of the meat have become more or less jellied.

Treatment of Muco-membranous Colitis (Capparoni, *Policlinico*, November 5, 1916).—In five years in hospitals and private practice 870 cases were observed. The disease occurs in three distinct groups: Simple mucous colitis, muco-membranous colitis, and muco-membranous colitis with visceroptosis. The first group is easily amenable to treatment, the two other groups are more resistant to treatment on account of the severe disturbances that accompany them.

The affection is frequently mistaken because the patient's description is not clear, and hysteria, neurasthenia, gastric neurosis or syphilis may be incriminated.

Women are apt to refer the abdominal pain to the ovary, uterus or to a movable kidney. Various disorders may be mistaken for colitis.

The treatment consists in excluding from the diet milk, fresh fruit, and vegetables and everything tending to increase uræmia. In general give a carbohydrate diet, with beef, veal, chicken, game, fish, and lean meat on account of their easy digestion. Exclude fatty substances, spicy food and alcoholic beverages.

Among the local measures are enemata, taken reclining, of 1 to 1,000 salicylic acid solution of ammoniated ichthyol 1 to 1,000. Either of these two solutions is a good disinfectant, is well borne, and causes very little irritation.

Symptoms are treated accordingly. Dyspepsia in particular is combated with small doses of alkalies ten minutes before each meal.

Castor oil is the only purgative allowed, and is given in a single dose of ½ oz. combined with belladonna. For the abdominal pain small doses of belladonna and extract of chamomile are given.

Where there is a tendency to anæmia, hypodermic injections of iron and arsenic are advised.

If the tenesmus and abdominal pain are severe, an enema containing bismuth, starch āā 10 grm., tr. opii 2 grm. in two litres of warm water. For the pseudo-appendicular colic give morphia combined with belladonna.

In the nervous disturbances which are so frequent in the chronic cases give hypodermic injections of phosphorus, 0·05 grm. phosphorus in 50 grm. of olive oil, injecting 2 c.c. daily for varying periods. In the mild nervous disturbances the phosphorus can be given by mouth in the form of the neutral sodium phosphates.

Hæmoptysis of Parasitic Origin in Soldiers from the Far East (Salmon and R. Neveu, Medical Society of the Hospitals of Paris).—Pulmonary distomatosis is but little known in France, although it is common in the Orient. At present large numbers of troops composed of men from the French colonies in the East are operating in France, and, undoubtedly, some of them, at least, are infected with these distomas. If so, they may serve as infection foci, their sputum being the infectious agent. Hæmoptysis is caused by the long distoma (*Paragonimus westermanni*) and mistaken for tuberculosis. The condition may be recognized by making an examination of the sputum, and finding in it blood and the eggs of the *Paragonimus*. Therefore, in all cases of bronchitis occurring among the Annamites or the Indo-Chinese troops the patients should be, without delay, sent to a base hospital. All Asiatics who are suffering from a stubborn bronchitis, with a rusty sputum or hæmoptysis, should be isolated immediately, and be furnished with sputum cups which are kept properly sterilized.

Abstracts.

SUBTERTIAN MALARIA IN SALONIKA.[1]

By A. W. Falconer and A. G. Anderson.

During last September; October, and November over 3,600 cases of malaria were seen. The high proportion of 40 per cent. of the negative blood finding is due to the patients being under the influence of quinine on admission to the hospital, and many of them had been several days under hospital treatment before admission to a base hospital.

The majority of the cases were of the simple subtertian, double subtertian, and irregular types of subtertian pyrexia without local manifestations. These cases uniformly responded well to treatment with quinine. The most important group of cases with local symptoms, on account both of relative frequency and of difficulty of differential diagnosis, were characterized by more or less urgent gastro-intestinal symptoms.

Dysenteric.—A large number of the cases were sent into hospital with a diagnosis of dysentery. A prominent symptom was the presence of diarrhœa. The great majority of the patients stated they were passing "blood and slime." In most cases the stools were fluid and fæculent, without definite blood or mucus, and they varied in number from six to fifteen or more in twenty-four hours. These cases rapidly improved under quinine. In a smaller number of cases the stools contained definite blood and mucus. It was possible in the great majority of these cases to demonstrate a superadded infection with one of the organisms of the dysenteric group. In a few other cases patients admitted with malaria but without dysenteric symptoms developed genuine bacterial dysentery; and again, cases with bacterial dysentery, after a few days in hospital, showed genuine malaria with protozoa in the blood. There were a considerable number of patients admitted whose dominant symptom was diarrhœa, and in whom repeated examinations of the stools failed to demonstrate any dysenteric organisms or amœbæ. Several of these cases died, and the autopsy showed, in some, slight congestion of the colon, chiefly in its upper part; in others, definite small submucous hæmorrhages; and in one, to be described in detail, extensive submucous hæmorrhages, but a perfectly intact mucous membrane. In many of these cases the bowels moved at first from twenty to thirty times a day. The stools were liquid, fæculent, and not unlike Worcester sauce. In the majority this diarrhœa very speedily subsided under energetic quinine treatment. In some the stools were fæcal, liquid, more or less heavily tinged with blood, and, very characteristic, notably bile-stained. This stool, although containing blood and traces of mucus, is yet macroscopically quite distinct from the typical dysenteric stool.

Corporal F., aged 32, admitted on September 20, 1916, with profuse diarrhœa and pyrexia. The bowels were moving about every hour; stools fluid, fæculent, and heavily tinged with bile and blood. Spleen enlarged and hard; blood film showed very heavy infection with subtertian parasites of all types, rings, rosettes and crescents. He was treated with intravenous quinine and salines. The stools were examined for organisms of dysenteric group and protozoa with a negative result. The diarrhœa continued, the stools constantly containing blood and traces of mucus. Ultimately he became incontinent and died eight days after admission. Postmortem, spleen was enlarged to four times normal size. Large intestine showed moderate congestion with small, punctate, submucous hæmorrhages; no ulceration, and whole mucous membrane smooth and glistening.

Sergeant B., aged 24, sent into hospital on September 2, 1916, with history of having been unwell for nine days, at first with constipation, abdominal pain, and vomiting. Three days before admission he began to suffer from severe diarrhœa. On admission he was collapsed and bowels moving every half hour; stools liquid, fæculent, and heavily stained with blood and bile. Marked icteric tinging of sclerotics. The blood showed the presence of numerous subtertian rings. The diarrhœa continued, and ultimately the motions appeared to consist of almost pure blood. Post-mortem, the whole of large bowel showed a microscopically intact smooth glistening mucous membrane without any suggestion of ulceration. Extensive submucous hæmorrhages were present throughout whole of large bowel.

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[1] Abstracted from the *Lancet*, April 21, 1917.

Choleric Pernicious Fever.—The two cases of this type died within fifteen hours of admission, in spite of intravenous quinine and salines.

Private K., admitted on September 14, 1916, from a camp alongside our lines. On admission was in state of profound collapse, with subnormal temperature, sunken cheeks, blue nails, and cold, cyanotic extremities. Mentally he was dull, and it was difficult to get a history, but it appeared he had not been well for two days, although he remained on duty till day of admission. Parasites not found in blood film. There was incontinence of fæces, and a watery brown fluid without visible blood or mucus continued to ooze from anus. He died within twelve hours of admission. Post-mortem, spleen was slightly enlarged and almost diffluent. Colon and sigmoid flexure presented moderate congestion, but no trace of ulceration. Smears from spleen, after prolonged search, showed rings and crescents of subtertian malaria.

The other case was a second attack, and the parasite was readily found in the blood.

Appendicular Type.—Twelve cases of this type strongly suggesting appendicitis. The chief complaint was vomiting and severe pain referred to the right iliac fossa, associated with moderate pyrexia and marked tenderness and rigidity in the right iliac fossa. In most of the cases it was possible to show that the rigidity was not constant. In some of the cases the tenderness was most marked somewhat above McBurney's point; in others it corresponded accurately with this point. In all cases the parasite in the blood or a definite enlargement of the spleen was found. None showed a leucocytosis, and all had the typical relative lymphocytosis of malaria. All rapidly cleared up under quinine treatment. In a few cases abdominal pain and rigidity were so marked and so diffuse as to suggest an acute abdomen, but these also rapidly cleared up under the use of quinine with the exception of one case which was complicated with septicæmia. This at the autopsy showed a purulent pleuritis and peritonitis, in the exudates of which streptococci were demonstrated.

Bilious Remittent Fever.—Thirteen fatal cases were of this type; had all been ill several days before admission to base hospital, collapsed, with marked yellowing of the conjunctivæ and a peculiar earthy facies. They suffered much from almost constant vomiting, and the majority from bilious diarrhœa and mental confusion. After treatment by intravenous quinine and intravenous saline they improved from a condition of apparently extreme urgency to one of relative comfort, but, unfortunately, the improvement was not maintained, and after a period of from two to five days their condition again became critical. The jaundice became deeper, the vomiting, often accompanied by uncontrollable hiccough, again became severe, the bowels incontinent, the temperature rose, and they died in coma or delirium. The chief macroscopic features post-mortem were enlargement of the spleen and submucous hæmorrhages in various organs, and the presence of a gallbladder distended with thick dark bile.

Pernicious Fever with Pulmonary Symptoms.—Both numerically and as a cause of death the next most important group was that in which the patients' dominant symptoms were referred to the respiratory tract. Of the fatal cases of malaria, pulmonary complications of a pneumonic or bronchopneumonic character were present in seven, and were the immediate cause of death. Amongst the patients admitted to the hospital were a large number who complained of respiratory symptoms, and some who were admitted under the varying diagnoses of bronchitis, broncho-pneumonia, and congestion of the lungs, were found subsequently to be suffering from subtertian malaria. In them the malarial parasite could be demonstrated in the blood. Amongst these cases were a small proportion who, in addition to their malaria, gave a history and presented the physical signs of a chronic bronchitis and emphysema, and in them the occurrence of a malarial attack caused a decided increase in their symptoms and physical signs. In the majority of cases, however, there was no history of bronchitis nor any evidence of emphysema. Amongst these the pulmonary complications could be divided into the bronchitic, the bronchopneumonic, and pneumonic.

The Bronchitic Type.—The patients complained of pain and tightness in the chest with persistent cough, accompanied by expectoration. They presented the ordinary signs of a diffuse bronchitis with numerous rhonchi and râles scattered all over both lungs. Some showed the typical malarial pyrexia, others an irregular intermittent pyrexia, while others ran a normal or subnormal temperature throughout their stay in hospital. They differed from an ordinary bronchitis, only in the presence in the blood of the malarial parasite, and their rapid response to treatment by quinine. It may be that the bronchitis is nothing more than that which is usually associated with the onset of any acute febrile illness. The respiratory symptoms are well marked, and the patient's complaint is entirely referred to his chest.

The Pneumonic and Broncho-pneumonic Type.—The term conveys that we are dealing here with a group of cases in which the physical signs suggest that there are in the lungs areas of more or less extensive consolidation, some definitely lobar, others lobular or confluent lobular. To this group belong the fatal cases already referred to. In all of these seven cases subtertian parasites were demonstrated in the blood, and in all were definite physical signs, in some lobar, in others lobular consolidation. At autopsy four showed definite lobar consolidation of one or more lobes, complicated in two cases by hæmorrhagic pleurisy. These showed the ordinary macroscopic appearance of lobar pneumonia in the grey hepatic stage. In the other three cases there was extensive lobular consolidation of both lungs. In one case there was present, in addition to the broncho-pneumonia, 12 oz. of blood-stained serous fluid in the pleural cavity. In both these groups appear to be superadded infections, in which the malarial parasite was at the most but a predisposing cause. It is worthy of note, however, that during this period only one case of pneumonia unassociated with malaria was admitted.

A third group comprised a series of cases which from the onset of the illness presented definite pulmonary physical signs and symptoms which pointed to areas of definite consolidation in the lungs, though the course of the disease was not that of a true lobar or lobular pneumonia. In the following two cases subtertian parasites were demonstrated in the blood:—

Private F., aged 20, reported sick on October 22, 1916. Admitted to hospital on the 29th, pale, with slight icteric tint of sclerotics. The spleen was three fingers' breadth below costal margin. Over left lower lobe posteriorly there was evidence of consolidation with bronchial breathing and numerous medium-sized moist râles. Anteriorly there was bronchial breathing in second, third, and fourth left intercostal spaces. No definite dullness on percussion either anteriorly or posteriorly and vocal resonance and fremitus not markedly increased. The lung condition remained practically unchanged until November 13, when the breath sounds lost their bronchial quality, became a little weak, and a friction rub developed over the left lower lobe posteriorly. On day of admission temperature rose to 103° F., pulse to 112, and respirations to 32. Next day temperature did not rise above 99° F., but on following day again rose to 103° F. It fell again on the subsequent day and then remained normal. The pulse-respiration ratio was not at any time much disturbed. There was little cough and no expectoration. He was treated with 20 gr. of quinine intramuscularly twice a day for the first six days, and then by 20 gr. intramuscularly and 40 gr. by mouth for the next seven days.

Lance-Corporal I., aged 29, reported sick on November 1, 1916, admitted to hospital on the 4th with diagnosis of congestion of lungs. He did not have the general appearance of pneumonia, nor did he look very ill. Dyspnœa was evident only on exertion. Spleen just palpable. Whole of right lung was involved. Anteriorly breath sounds above and below clavicle were bronchial, and all over anterior aspect of lung were numerous moist sticky râles. Movement was diminished, but no appreciable percussion dullness. Posteriorly there was slight percussion dullness over right supraspinous fossa and over right base. Breath sounds over supraspinous fossa were bronchial, and in a small area just below spine of scapula distinctly tubular. Numerous râles were present all over right lung and a few râles at left base. On admission temperature 99·8° F., pulse 96, respirations 36. On following day temperature was again 99·8° F., falling on third day to normal. On the fourth day his general condition became worse. The temperature rose to 102·8° F., and for two days he lay in a curious state of wandering delirium. His temperature fell on the following day, and did not rise above 99° F. at any other period of his illness. During the sudden rise in temperature the pulse was 84 and respirations 30, showing a distinct disturbance of pulse-respiration ratio. The signs over right side of chest gradually diminished, but on the 12th, without any rise of temperature or any increase in symptoms, a large area of consolidation was found over the left lower lobe posteriorly, accompanied by numerous moist râles. On the 27th the right lung was completely clear, but the left lower lobe still showed bronchial breathing and râles. At no time was there any expectoration. Quinine was given by mouth.

Cerebral Cases.—An extremely interesting, but relatively small, group of cases presented cerebral symptoms of the well-recognized cerebral types. In nine cases the dominant symptoms have been due to local affections of the nervous system. Two of these were of the bulbar type and showed temporary paralysis of the muscles supplied by the bulbar nuclei; both recovered and were discharged from the hospital without any evidence of organic disease. One patient was admitted with a diagnosis of debility. Twenty-four hours after admission he suddenly became comatose, and remained so for fifteen hours. He also completely recovered. One patient twenty-one hours after admission, while in the latrine, developed an epileptiform fit. These fits, which were of a general epileptiform character, were repeated about twelve times in the following twenty-four hours. The left leg became somewhat weaker than the right and developed an extensor plantar reflex, which at the time of writing is still present. In addition the patient still presents definite nystagmus and a tendency to a reeling gait, but no evidence of active disease. In four cases the most marked symptom was violent delirium, which persisted for several days uninfluenced by variations in the temperature. In three of the cases there was a high, intermittent pyrexia, in one the temperature was never above 99° F. In all the cases subtertian parasites were demonstrated in the blood, and all the cases completely recovered. One patient presented meningitic symptoms associated with pneumonia at the right base. This patient died. The autopsy showed a considerable excess of cerebrospinal fluid beneath the tentorium with œdema of the pia-arachnoid over the base, and congestion of the vessels over the pons. Section of the brain after hardening in formalin showed no evidence of gross brain disease. The middle and lower lobes of the right lung presented the features of an ordinary croupous pneumonia.

Generalized Œdema with Ascites.—Two cases were admitted complaining of breathlessness and having generalized œdema.

Driver W., aged 35, reported sick on October 6, 1916, admitted to hospital on the 9th with œdema of hands, feet, and legs, and eyelids puffy. Visible mucous membrane almost colourless; some lemon-coloured tinting of sclerotics. Abdomen notably distended, subcutaneous tissues œdematous, and all the characteristic signs of a considerable accumulation of free fluid in peritoneal cavity. The spleen extended almost to umbilicus; liver not enlarged. Slight mitral systolic murmur, rate of pulse 78, and rhythm of heart normal. Apex beat in fourth space in nipple line. Nothing abnormal was made out in the lungs. The urine was of a specific gravity 1012, clear, straw-coloured; no albumin, bile, or sugar; deposit showed a few uric acid crystals, but no casts. Temperature normal on day of admission (October 9), but rose to 103° F. on evening of 10th, to fall on morning of 11th to 99·8° F. From the 15th onwards temperature remained normal. Blood film showed presence of subtertian rings and crescents. Treatment by intravenous quinine was commenced on the 10th, and later continued intramuscularly and by mouth. On the 12th condition was immensely improved; œdema of feet and hands had almost disappeared, and it was no longer possible to demonstrate the free fluid in abdominal cavity. On the 16th the blood was free from parasites, and he was discharged to hospital ship on the 23rd.

Private B., aged 25, reported sick on October 27, 1916, complaining of swelling of legs and breathlessness; previous to present illness had always been healthy. He was admitted to hospital on the 27th. On admission patient presented notable œdema of legs and of subcutaneous tissues of back and abdomen, and eyes were puffy. Visible mucous membrane pale; slight lemon tint of sclerotics. Abdomen considerably distended, and gave all the characteristic signs of free fluid in abdominal cavity. Spleen extended almost to umbilicus; lower margin of liver half an inch below costal margin. Apex beat of heart in fifth space almost in nipple line; pulse-rate 96, rhythm normal; second pulmonic sound not definitely accentuated. Nothing abnormal made out in lungs. The urine did not contain albumin or casts. Blood film showed presence of subtertian crescents and rings and red blood cells marked anisocytosis and polychromatophilia. Temperature normal and remained so. Patient treated at first with intramuscular quinine and later with quinine by mouth. By November 11 œdema of extremities and physical signs of ascites had completely disappeared. He was discharged to a hospital ship on November 15.

In these two cases the œdema was of toxic vascular origin similar to the œdema and ascites seen in the late stages of multilobular cirrhosis of the liver.

Gangrene of the Feet.—Another group, consisting of three cases, showed evidence of local vascular changes in the development of gangrene of the toes.

Private B., A.S.C., aged 26, reported sick on October 1, admitted to hospital on October 4. Temperature was 102° F., conjunctivæ slightly icteric, and spleen palpable. Blood film showed presence of numerous subtertian parasites. He complained of very severe pain in both feet, shooting up the legs; both feet were considerably œdematous, and over dorsum of each foot was a large purple ecchymosis. The great toe and all smaller toes of right foot and the small toes of left foot were slightly swollen and almost black in colour. On soles of both feet, from bases of toes backwards for a distance of about 1 in., the skin was purple in colour. Sensation to gross touch was still present; the dorsalis pedis and posterior tibial arteries of both feet could be felt pulsating quite strongly. As it was considered possible that a vascular spasm aggravated by quinine might be a factor in the condition, the patient was not given quinine, but was treated with 0·4 grm. galyl intravenously. Next morning the temperature had fallen to normal, and remained so for the remainder of the patient's stay in hospital. The general condition steadily improved; blood reported negative to malaria on the 10th. The feet rapidly improved, and apart from slight superficial necrosis on dorsum of right foot completely recovered. On October 14 he was put on 20 gr. quin. sulph. daily by mouth, and was discharged to hospital ship on the 28th.

Private M., aged 24, reported sick on October 5, admitted to hospital on October 11, complained of pain in feet. Presented distinct icteric tinging of sclerotics; spleen palpable. Both feet showed discoloration of the toes, the left foot being more affected than the right. All the toes of both feet were affected, the colour varying from brownish-purple to purple. On the left foot the plantar surface of all the toes showed small bullæ; on the right foot only the large and third toes presented bullæ. The dorsalis pedis and the posterior tibial arteries of both feet could be readily felt pulsating. Patient was put on 1 drm. quin. sulph. daily and steadily improved. Both feet recovered without any loss of tissue.

Driver W., aged 21, admitted to base hospital on October 9 with diagnosis of malaria. On second day of admission to a field ambulance the feet became very cold, and continued so in spite of hot bottles. Next day the feet were seen to be blue. On admission to base hospital there was considerable œdema of both feet, all the toes of both feet were blue with large bullæ, especially on right big and second toes, extending for some distance over dorsum of feet. Several bullæ were burst and were discharging sero-purulent fluid. The dorsalis pedis and posterior tibial arteries could be felt beating quite strongly in both feet. Marked icteric tinging of sclerotics; spleen palpable 1 in. below left costal margin. Blood film showed no malarial parasites. Patient on admission was given an intravenous injection of 0·4 grm. galyl, and ten days later was put upon quinine. General condition rapidly improved, but considerable sloughing occurred over dorsum of large and second toes of right foot, involving loss of nail of great toe, and opening into first interphalangeal joint of second toe. Also slight superficial sloughing over dorsum of left large toe.

MORTALITY AND POST-MORTEM FINDINGS.

Thirty cases infected with malaria have died. Of these one was a case of subtertian malaria who was quite convalescent from malaria when he developed an extremely septic throat, followed by pneumonia. Post-mortem there was ulceration of the pharynx and epiglottis with septic consolidation of both lower lobes of the lungs. In two cases there was, in addition to malaria, a Shiga dysentery, and the patients died of running dysentery. Post-mortem, in both cases almost the entire mucous membrane of the whole of the lower bowel and the lowest two feet of the ileum was destroyed. One case died of amœbic dysentery and septicæmia. The mucous membrane of the lower bowel was much destroyed, and there were abscesses in both kidneys. Four cases died of lobar pneumonia affecting one or more lobes. In one of these there was, in addition, an extensive hæmorrhagic pleural exudate. In those cases malaria was not the cause of death.

This leaves twenty-two cases with a total case mortality of 0·61 per cent. Three cases presented at the autopsy extensive lobular consolidation of the lungs, complicated in one by hæmorrhagic pleurisy. The immediate cause of death in those cases was also probably the lung condition, and it is a debatable question whether they represent a double infection or a true complication of malaria. Two cases died of septicæmia. One was admitted to hospital with a septic arm following an intramuscular injection of quinine. At the autopsy pyæmic abscesses were found in the lungs and kidney and recent vegetation on the mitral valve. One was admitted in an extremely collapsed condition with numerous septic sores on both arms and developed signs of pleural and peritoneal effusion. At the autopsy there was found a right-sided septic pleural effusion and septic peritonitis. Streptococci were recovered from the pleural and peritoneal fluids.

Excluding those five cases, we have seventeen cases of uncomplicated malaria with a mortality of 0·47 per cent. In one case the autopsy disclosed moderately advanced granular kidneys, and in one case a right-sided hydronephrosis which had largely destroyed the right kidney.

OVERLOOKED COMMON DUCT STONES.[1]

By D. N. EISENDRATH.

THE conditions that cause recurrences following operations on the bile passages are:—

(1) Calculi present in the common or hepatic ducts without giving rise to the symptoms which we have always considered pathognomonic of calculi in these locations.

(2) Even at operation when the common duct is palpated to determine the presence of calculi, they may be found in a certain percentage of cases even if palpation by usual methods yield negative results.

The expression "usual methods" refers to the fact that the segment of the common duct which is almost invariably palpated is the supraduodenal portion. Calculi lying in the retroduodenal division —that is, just above the ampulla—are not palpable through the overlying duodenum unless they are of relatively large size or unless the mobilization incision of Kocher has been employed to expose the retroduodenal portion for direct palpation.

In seventeen, or 46 per cent., of thirty-six recorded cases in which palpation of the common duct was negative, calculi were found in either the hepatic or the retroduodenal portions of the common ducts. The reason such calculi are often overlooked, or rather, why they are not felt is that they swim in the stagnant bile or lie just above the ampulla in the retroduodenal portion, which is not readily accessible to palpation. In about 20 per cent. of all the cases the common duct calculi belonged to the latent class—that is, produced no symptoms, such as icterus, chills and fever, which we have always considered to be characteristic of such calculi.

During the past four years, in the course of a large number of operations on the biliary passages, I have explored the common and hepatic ducts in thirty cases in which palpation was negative. In ten (33·3 per cent.) of these calculi[1] were found on exploration in spite of negative palpation. None of these thirty patients died, and the mortality will not be increased in the hands of other surgeons if a rapid technique for exploring the common and hepatic ducts is developed by the surgeon. Four indications are of especial importance, in the order named: (1) The presence of many small calculi in the gall-bladder of cystic duct; (2) an enlarged, thick-walled common duct; (3) the presence of chills, fever or icterus; (4) recurrence of pain or symptoms of cholangeitis (chills, fever, &c.) after previous operations, such as drainage or removal of the gall-bladder, or even after previous choledochostomies. In two of my ten cases with positive findings (although even my palpation had been negative), operation had been performed by other surgeons.

In one of these the gall-bladder had been explored without finding calculi and then drained. Eighteen months later the patient began to have pain in the right hypochondrium with icterus, and I operated on him. The gall-bladder walls were thick, but no calculi were found. The common duct was of the size of two adult thumbs, thin-walled and negative on palpation. On exploration of the common duct, a calculus the size of a navy bean was found just above the ampulla.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, March 31, 1917.

[1] In six cases the common duct calculi were of such size as to render it improbable that they would have passed into the duodenum spontaneously.

In a second case the greatly thickened gall-bladder containing a large calculus impacted at its neck had been removed by one of my colleagues. Two years later the patient began to have pain in the epigastrium, icterus, chills and fever. The common duct was greatly enlarged, and although palpation was negative, two faceted calculi, the size of a bean, were found just above the ampulla. In neither of these cases were any symptoms referable to the common duct calculi present at the time of the primary operation, and there has been no recurrence since the secondary one.[1]

The chief indication for opening the common duct in eight cases, in spite of negative palpation, was the presence of many small calculi in the gall-bladder. In all of the eight cases of positive exploration after negative palpation the number of calculi in the gall-bladder varied from 20 to 300.

In three cases the common duct calculi were the size of a pea, faceted, and fifteen in number. In the majority of the ten cases the calculi were found in the retroduodenal portion of the duct. In two cases a number of small calculi of the same size and composition as those in the gall-bladder and common duct were either found in the hepatic duct or escaped in a perfect shower from this duct while the edges of the opening in the common duct were retracted. In one of these patients there had been a recurrence of symptoms, in spite of a cholecystectomy and choledochostomy with removal of calculi from the common duct.

The three last cases are in all probability due to the formation of calculi in the intrahepatic bile passages, and explain some of the cases of recurrence even after removal of calculi and drainage of the common and hepatic ducts.

In eight cases in which no previous operation had been performed the principal symptoms were:—

(1) Pain, for months to years, not to be distinguished from that due to the gall-bladder.

(2) Icterus, slight and only during attacks of pain in three cases. In one case there had been distinct icterus during one attack. In the remaining four cases there was no icterus at any time.

(3) Chills and fever, present in only one case of the eight. The common duct varied in size from a little finger to a thumb. The pancreas was hard and enlarged in only three of the ten cases.

The systematic exploration of the common and hepatic ducts has not increased the mortality. The fact that symptoms pointing to common duct calculi were absent in the majority (six of ten cases) shows that we have a clinical group of silent or latent calculi which may escape palpation by the surgeon unless he is prepared to make a thorough exploration of the bile passages if the indications just given are present.

The finding of calculi in the hepatic and common ducts in ten of thirty cases after negative palpation of the common duct shows how easy it is for one to overlook such calculi. With more thorough search for calculi in the common and hepatic ducts our percentage of recurrences must rapidly decrease.

It is my practice to open the gall-bladder first, and after the calculi have been taken out to use it as a tractor while the common duct is opened in its supraduodenal portion. After the common and hepatic ducts have been explored, the calculi removed, and a T-shaped drain inserted, a cholecystectomy is performed as the last step in suitable cases.

CONCLUSIONS.

(1) In 20 per cent. of cases of calculi in the hepatic and common ducts, either no symptoms indicative of their presence are found or they are overshadowed by those of an accompanying gall-bladder condition.

(2) In the past four years calculi have been found at the lower end of the common duct in ten of thirty cases in which palpation was negative.

(3) Exploration of the common duct does not increase the mortality, and should be done whenever one of the indications given above is present.

(4) Recurrence following operations on the gall-bladder and common duct may be due to overlooked or newly formed calculi in the intrahepatic bile passages.

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[1] Since reading this paper I have removed three calculi, the size of a pea, from the common duct in a patient on whom a previous drainage and later removal of the gall-bladder had been done by another surgeon. At the first operation a large number of small calculi were removed and the common duct found negative on palpation. The gall-bladder was removed three months later on account of a biliary fistula due to a stone in the cystic duct. Jaundice and fever followed the second operation, and three months later I found the common duct greatly dilated and one of the three calculi impacted in the ampulla of Vater.

BRAZILIAN BERIBERI.[1]

By J. W. LINDSAY.

A BERIBERI patient from Matto Grosso gave the following history. In 1895-96 he was living in Corumba, employed in a large business house in which there were thirteen employees in all. Ten of them were attacked with beriberi—at first two men, then one by one, until within a month ten of them had sickened. The chief symptoms were dropsy and paralysis. Some of the patients had to be carried on board the river-boats, others were able to walk down with the help of two sticks. They all went to higher altitudes and returned cured within two months, all except one who went to his home at Miranda, where beriberi is endemic, and died.

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[1] Abstracted from the *Transactions of the Society of Tropical Medicine and Hygiene*, March, 1917.

Their diet previous to their illness had consisted of meat, fowl, milk, white bread, vegetables, salads, fruit, native-grown rice, and maize. They drank the water of the river. The patients were all seen by a Brazilian doctor, who diagnosed the disease as beriberi.

The patient, A. P. C., who related this story, had, after twenty years, a second attack of beriberi, and came under my care. Forty years old, a native of Cayuba, later resident at Corumba, where he had his first attack of beriberi, and now resident in the south-eastern corner of the State towards the basin of the Upper Parana, he fell ill on June 20, 1915, but was not seen by me until the beginning of August. His first symptoms were those of fever, and pains in the joints and epigastrium, numbness of the hands and feet, and swelling of the legs. Realizing that he was seriously ill, he resolved to undertake the journey to the nearest Brazilian town of Punta Rora, and so, on the third day of his illness, he made his men carry him on a stretcher some fifteen miles to the house of a friend on the way to the town. Even this short journey was almost too much for him, and he had to remain there some three weeks. The fever lasted ten days in all, but the weakness and swelling continued. His legs were completely paralysed. He gradually lost his voice, at first being unable to articulate the sounds of *r* and *l*, then gradually becoming completely aphonic. This aphonia lasted some eight or nine days, and then his voice began to recover. He began to feel his feet and to be able to move them. He had become exceedingly weak and very anæmic. The improvement in his condition began from the time he left his friend's house, on July 16, and by the time he had covered the ninety miles to reach the town on the hills he was feeling remarkably well. Wishing, however, to make absolutely sure of a complete cure, he came on, 210 miles farther, to my place, arriving in a bullock cart on August 9, fifty days after the beginning of his disease.

The patient was extremely emaciated and very anæmic. The left leg had begun to recover, and there was a certain amount of control over the foot. The knee reflex was completely absent. The right leg was completely paralysed and the knee-jerk absent. There was considerable numbness of the legs and hands. On several occasions, when trying to lift a glass to drink, he let it slip from his fingers. On one occasion, when he was feeling very much improved, in the absence of his servant he tried to take his medicine himself. He told me that he reached for the bottle, grasped it firmly—as he thought—by the neck, and raised it from the table, but it immediately slipped from his grasp and fell to the floor. The voice had not completely recovered. There was a dilatation of the right side of the heart, with systolic murmurs. There was no albumin in the urine. The feet were still swollen. The knee-jerk of the left leg was the first to return, and that of the right leg a month later. The heart condition was so critical that he was not allowed to rise until the middle of November. During all the time he was in bed his servant had massaged and moved his legs, so that when he was allowed to rise he was able, within about a week, to walk by himself. His gait, however, was for some time slightly ataxic.

This patient's residence, where he had lived continuously for six months before he contracted his disease, was in the Yerba Matté virgin forests. From the same district many peons, or native labourers, come suffering from buba, or *Leishmaniasis americana*. The water used at his station was from a stream running towards the Parana valley. As manager of a plantation, the patient had been able to live in comfort and feed well. His ordinary diet consisted of fresh meat every day, beans, rice, vegetables, fruit, mandioca, maize, bread. The patient was a very abstemious man, and, besides, alcoholic liquors are not allowed on the plantations. The patient, recalling his earlier attack twenty years before, and the fact that he had recovered completely within a month and a half, did not agree with my diagnosis that his disease was beriberi, and, besides, no others were known to have suffered from such a disease in that district during the years he had been resident there. Two years previously, however, a case was brought to me from a place a few leagues distant from A. P. C.'s residence, suffering from the dropsical form and with a very bad heart. He unfortunately died shortly after he arrived. I have notes also of a case exactly similar to that of A. P. C., the patient coming from the same district in 1911. He took some six months to get well, and only began to show marked improvement when he went down to Buenos Aires, a distance of some 1,500 miles. He returned from there completely cured.

The patient, A. P. C., made an excellent recovery, and when he left was enjoying better health than he had done for many years.

DIEMENAL IN THE TREATMENT OF MALARIAL FEVER.[1]

By George C. Low.

Recently a substance termed "Diemenal," a solution of "colloidal" manganese, has been tried in the treatment of malarial fever. In a pamphlet which accompanies the samples of the drug, it is stated that this form of colloidal manganese is a specific for malaria, and that it produces no undesirable effects.

The method of treatment is as follows: One injection of 10 c.c. daily is given hypodermically for four to six days. After the second or third injection the temperature is normal, and remains definitely so. The number of injections is, however, usually carried to six, bearing in mind the importance of immunization. It is perfectly well tolerated, and the injections are painless.

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[1] Abstracted from the *Transactions of the Society of Tropical Medicine and Hygiene*, March, 1917.

In the pamphlet no mention is made of blood examinations to determine the effect of the drug on the parasites.

The drug was tried in a case of benign tertian malaria (single infection), the treatment being checked by careful blood examinations.

History of Case.—O. L., a Dane, had been all over the world, following out his vocation as a sailor. Recently had been in Java, and had visited several of the coast towns. Twelve days after leaving the last of these, on the voyage home, developed fever. Others of the crew got it as well, and though quinine was administered, it was not evidently given in sufficient quantity, as most of the patients were still having attacks of fever on arrival in England. Five of these were admitted into the Royal Albert Dock Hospital, two being benign tertian infections, one a quartan, and two malignant. O. L. was one of the former, and had a temperature of 103° F., benign tertian parasites being found in his blood. He had never suffered from malaria before.

Systems.—Nothing of importance. Liver and spleen not enlarged.

Urine.—No albumin, blood, or sugar.

Fæces.—Negative; no protozoa, no ova.

Blood.—Benign tertian parasites, gametes and rings, one generation.

Treatment.—Beginning on March 1, 1917, daily doses of 10 c.c. "Diemenal" were administered hypodermically for six days in all. These gave rise to no inconvenience. The patient was at the same time put to bed and kept warm. After the fifth injection the rise of temperature due on March 7 did not take place, but the blood examinations showed that parasites were still present. As keeping such cases rigidly in bed often results in a fall of temperature, irrespective of any drug being given, the patient was ordered up to move about the wards. Rigors began again at once with an increase of the parasites in the blood.

After it was seen that the patient was not cured he was put upon quinine in the usual doses, this stopping further rises of temperature, and quickly causing the parasites to disappear from his blood.

AMERICAN LEISHMANIASIS AS A GENERAL INFECTION.[1]

By J. W. Lindsay.

Although not suffering in their general health in any way, yet the dread patients have of the inevitable invasion (as they believe) of the nose and pharynx, makes all such patients seek medical help as soon as possible.

The following are cases in which the naso-pharyngeal ulceration appeared at varying intervals after the appearance of the initial papule:—

(1) Aged 25. Three months ago two ulcers appeared on the right leg and one on the left arm, and another to the right of the umbilicus; within two months the ulcers had healed spontaneously, but as they healed nasal symptoms began to appear, and have increased.

(2) Aged 20. Five months ago a buba papule and ulcer appeared on the right temple; the sore is now cicatrizing spontaneously, but the naso-pharyngeal symptoms have appeared and progressed rapidly.

(3) Aged 35. Six months ago ulcers appeared on the right forearm and left upper arm; these now show signs of healing, but the nose and upper lip are already badly ulcerated.

(4) Aged 27. Had three healed ulcers in leg; these had appeared two years ago, and within a year began healing spontaneously; three months ago nasal symptoms began to appear, and now there is well-marked ulceration of the nose and thickening of the soft palate.

(5) Aged 34. Seven or eight years ago had ulcers on right heel and left hand, which healed spontaneously in four years. In the third year the nose and throat became affected, and now are extensively ulcerated.

The two following cases may illustrate the theory that blows or abrasions may determine the point of lodgment:—

(6) Aged 25. Three years ago was in rather poor health, being very anæmic; in this state he had a small accident, in which the dorsum of the right foot was wounded by a bamboo. The wound, instead of healing, developed into a buba ulcer; later, another ulcer appeared over the outer left ankle. Within one year the ulcers had healed spontaneously, but as they healed nasal symptoms appeared, and in the last two years there has been extensive invasion of the naso-pharynx.

(7) Aged 24. Five years ago his cart upset, and he was wounded on the right inner heel by the zinc roof of the cart. The wound did not heal but degenerated into a buba ulcer, involving the whole of the heel from the inner to the outer aspects. In four years the ulcer healed spontaneously, but about six months before it healed the nose began to be affected, and within a year the whole naso-pharyngo-laryngeal tract has become extensively invaded, the soft palate and uvula thickened and papillated. Over the heel there is a white cicatrix, 3½ in. long by 1 in. broad.

As will be seen from the histories of the cases given, there are great differences in the severity of the infection, the fulminant cases having the secondary ulceration appearing within a few months, the slower cases perhaps only after years.

All the severe cases agree in this, that, coincident with the beginning of spontaneous cicatrization of the original sore, the secondary naso-bucco-pharyngo-laryngeal symptoms almost inevitably appear.

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[1] Abstracted from the *Transactions of the Society of Tropical Medicine and Hygiene*, March, 1917.

Original Communications.

KERATODERMIA PUNCTATA.

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Medical Corps, Egyptian Army.

Contents. — *Introductory — Sudanese Case — Pathological Histology — Ætiology — Pathology — Comparisons — Classification — Diagnosis — Treatment—Summary—Acknowledgments—References—Illustrations.*

Introductory.—This is the second of what is hoped will be a short series of notes dealing with the Hyperkeratoses met with in the Anglo-Egyptian Sudan. It owes its origin to a female barber applying for medical aid at Shendi, a town some seventy miles north of Khartoum, for the condition of the palms of her hands depicted in Plate I, figs. 1 and 2, of the illustrations attached to this paper.

As the condition appeared to be unusual, it was thought that a brief description might be of interest to some tropical practitioners.

Sudanese Case.—The patient is an Arab woman, aged about 40 years, employed as a hairdresser and barber for native women. In her work she employs animal fats derived from sheep and cows, vegetable oil obtained from sesame (*Sesamum indicum* De Candolle), the common gum of the Sudan (*Acacia* sp.?), "Dufur," a marine shell product, cloves, mahlab, and santal (vegetable products), zabad and musk (animal products). These articles are used as lotions or pomades for dressing the many-plaited hairs of the Sudanese women who are her customers. None of these contain any arsenic.

She complains of the disfigurement of her hands and of itching and uneasiness in the palms, and says that the condition depicted in figs. 1 and 2 has only lasted some eight to nine months, and that nothing of a similar condition has been known in her family. There is no history or sign of syphilis, and no knowledge of arsenic in any form having been taken or used.

The condition of the palms of her hands is depicted in figs. 1 and 2, which, when examined, show that the palms of both hands and the ventral aspects of the fingers present a pitted appearance associated with some thickening of the horny layer, which is more marked in the left than in the right palm. This pitted appearance extends in both hands from the lower crease of the wrist to the terminal phalanges of the fingers on their ventral aspects, and does not reach to the dorsum except on the inner side and dorsum of each little finger.

There is no similar eruption on any part of her body, but there is a slight callosity on the solar aspect of the right heel.

When the palms and ventral aspects of the fingers are examined by the naked eye it is seen that the pits are very numerous, rounded, and appearing to sink into the epidermis. The left palm possesses thickened epidermic patches which are distinctly horny to the touch, while on the right palm the horny sensation is much less marked. The flexor aspects of the fingers, particularly on the left, are also horny. No hyperæmia could be seen, but there was some hyperpigmentation which was specially marked in the thickened epidermic areas of the left hand.

These thickened areas on both hands can be observed to be cracked along the lines of flexure, but this is especially marked in the fingers. The nails are quite normal. There is no marked hyperidrosis, though she states that the palms do sweat a good deal when she is working. After using any watery liquid there is itching in the palms of the hands, but at no other time.

When examined carefully by means of a low-power lens it is noticed that the horny layer of the epidermis is heaped up into a little circular ring at the orifice of a sweat duct (fig. 2). This heaped-up mass of horny cells increases in size and, joining with other similar small masses, forms a small translucent cupola or irregularly shaped swelling, which may exude fluid at its apex and form a small central umbilicated scab.

This scab becomes surrounded by a circular depression, which gradually deepens, and marks off a deep cone-shaped horny plug not unlike the core of a corn, while the surrounding dermis becomes erythematous.

The central corn-like mass comes away and leaves behind a deepish cavity possessing a reddish base, steep walls, and undermined horny edges. This depression appears to be entirely situate in the horny layer.

It is the formation of these depressions which gives rise to the pitted appearance of the hands, while the cores before separation look like small corns.

The depression so produced gradually fills up from the bottom with horny cells, but in so doing is apt to give rise to crusts which, when removed, show that the cavity is becoming shallower, while its edges become rolled in and not undermined.

When completely filled in it forms a small thickened area which, when joined to similar areas, forms a horny patch.

The sweat pores on such a horny ridge or patch are quite patent, as can be demonstrated by stimulating the horny tissue in the neighbourhood by means of a needle, when the sweat can be seen by means of a lens to exude from the pores, while a marked local erythema is also produced.

Pathological Histology.—The present histological account is based upon a cuticular shaving removed from the palm of the right hand and a piece of tissue cut away from the ulnar side of the left palm. This latter piece, which was cut into serial sections, unfortunately was not deep enough to include the sweat glands, a defect which we are unable to remedy.

When the palm of the right hand, depicted in fig. 1, is examined, it will be observed that an epidermal shaving has been removed in the neighbourhood of the ring finger. This shaving slightly magnified is illustrated in fig. 3, which, if examined, is seen to possess three punctations or corns, and one empty space from which a corn has dropped out.

When one of the sections cut from the piece of tissue removed from the left palm is examined under a low power of the microscope it will be seen to show the features depicted in fig. 4.

It will be noted that there is general thickening of the *Stratum Corneum*, which shows alternate dark and light vertical areas. The light areas agree with the situations of the sweat canals, which are much dilated (figs. 4 and 6) even when they run through the whole vertical depth of the horny layer, the cells of which in the vicinity of these canals are more or less œdematous. Other lighter areas show only the remains of sweat canals (fig. 5), and in this case there is considerable surrounding infiltration. Still other areas exhibit widely dilated spaces where the sweat canal should run (figs. 10 and 7).

The dark areas are composed of cells more closely welded together, and they correspond below to the wedges of the *Stratum Lucidum*, presently to be mentioned.

Superficially the horny layer is covered by loose, oval, horny scales, evidently derived from the deeper cells.

On its deep aspect it joins with the *Stratum Lucidum*, except at the spots where it contains the corn-like bodies, when it springs directly from the *Rete Malpighii.*

The most striking objects contained in the horny layer are the corn-like bodies depicted in figs. 4 and 6, which correspond to the bodies depicted in fig. 3.

The *corn-like bodies* are roughly cone-shaped (fig. 4) with the apex situate below, where it presses upon the subjacent structures, and takes its origin directly from the *Rete Malpighii* without the intervention of either the *Stratum Granulosum* or the *Stratum Lucidum.*

These bodies are composed of nucleated horny cells, arranged in super-imposed layers which appear to be rather loosely attached laterally to the rest of the horny layer (as may be seen on the right side of fig. 4) because they appear to be readily separable (*vide* figs. 4 and 6), as has been noted in the clinical description. On their deep aspect the bodies are firmly fixed, but on their superficial aspect they appear but loosely attached by means of the layer of scales mentioned above (fig. 6), while in the centre they generally possess some of these scales, covering over a nucleated mass of cells or some debris.

These nucleated masses of cells seem to take their origin deep in the corn-like mass by the usually elongated cells becoming shorter and more welded together, as patches of such small masses may be seen lying between the transversely running layers of elongated cells.

Leaving now the horny layer and proceeding more deeply into the section, it is noted that the *Stratum Lucidum* (fig. 23) is well marked. In the parts corresponding to the darker vertical areas of the horny layer it forms wedge-shaped masses (one of which can just be seen on the extreme right of fig. 4), the apex of which presses into and bends down the underlying layer of granule cells.

The *Stratum Granulosum* (figs. 8 and 23) is usually composed of four layers of large granular cells which, however, stop abruptly as they approach the apex of a corn-like body (fig. 8).

The *Rete Malpighii* (figs. 8, 9, 10, 11, and 23) appears to be normal, except under the apex of the corn, where it is compressed and thinned, forming here the site of origin of the cells of the corn.

The *Stratum Germinativum* (figs. 9, 11, and 12) is normal, except in a few places where the cells are separated from one another by intercellular spaces, obviously dilated owing to the accumulation of lymph. Under the apex of a corn it also is compressed.

The *Corium* is distinctly pathological (fig. 10), as it contains dilated vessels, closed vessels, and masses of cells.

The *papillæ*, which are absent under the apex of a corn (figs. 4 and 9), are compressed and twisted laterally to this apex (figs. 4 and 9), and are usually more or less normal in length (figs. 4 and 11) and breadth, but in a few places are apt to be so bent that in cutting the section a small area near the apex may appear as an island surrounded by cells belonging to the *Rete Malphigii*, but we have never observed islands of that nature in the *Stratum Corneum*, nor in the corn-like masses thereof.

The vessels of the papillæ are dilated as well as the lymphatics which are imbedded in sodden-looking fibrous tissue, which also holds a certain number of connective tissue and endothelial cells (figs. 9 and 11).

The so-called subpapillary layer of the corium is infiltrated with cells through the breadth of the sections, but this cellular infiltration is much more marked under the apex of the corn where it is compressed (fig. 9), and in the neighbourhood of the same when it is present in masses (figs. 10, 11, and 12) which contain dilated capillary vessels, both blood and lymph (fig. 12). Still more distant (laterally and vertically) from the corn-like mass the cellular exudate diminishes considerably, the masses being fewer and smaller.

There are, of course, no hair follicles to be seen, and unfortunately no sweat glands are to be found in our sections, which are not sufficiently deep, but sweat ducts are evident (figs. 11, 21, and 22). Even in the deepest portions of our sections these ducts are more or less associated with dilated blood and lymph vessels, while more superficially (figs. 21, 22, and 11) they come in contact with the cellular exudate mentioned above.

The walls of these ducts (figs. 21 and 22) appear to be abnormally thick, due to an increase in the number of the lining cells, while the lumen is generally very evident.

Tracing these ducts superficially, they enter the

Rete, in which they are bent laterally if situate directly under the apex of a corn, and passing through this are seen to be blocked by the lateral portions of this body (figs. 6 and 5), and to end in exudate into the horny cells (figs. 5 and 6), or into spaces (fig. 10). Their further course in the *Stratum Corneum* has already been traced and is exhibited in figs. 4, 5, 6, 7, and 10.

The substance of the corium is composed of dense fibrous tissue (figs. 9 and 10), but we had insufficient material to enable us to study the elastic fibres. In this tissue are imbedded the masses of cells and dilated vessels (figs. 8, 9, 10, and 11).

Particularly in the parts in relationship to a cornlike mass, but also in other parts, it is possible to observe vessels showing endarteritis (used in its widest sense), *vide* figs. 14 and 15, or periarteritis (fig. 16), or even clotting and organization (figs. 17, 20, 14, and 13).

Portions of the fibrous connective tissue lying just beneath the *Stratum Germinativum* appear to be œdematous, as indicated by their staining reactions.

Such are roughly the low-power appearances of our sections, and it now behoves us to inquire more minutely into the structure of the cellular masses, together with that of the vessels which are so closely associated with them.

Many of the cells (fig. 12) appear to be indicated by a nucleus (fig. 18), bounded by a very distinct nuclear membrane and possessing an open nuclear network with karyosomes, surrounded by but little cytoplasm, and, following Macleod, we classify these as being derived from the connective tissue cells, because we have seen all degrees of change from the typical nucleus of the fixed connective tissue cell to this type of nucleus.

But we are convinced that there is another origin for a large number of the cells, and this is the endothelium of the vessels. If fig. 19 is examined it will be seen that at the right-hand upper corner of the vessel depicted there is an endothelial cell which has grown outwards from the vessel wall, while it will also be noted that its nucleus is vesicular with a well-defined nuclear membrane. We are inclined to trace to cells like this the origin of those cells which possess an excentrically placed nucleus with a well-defined nuclear membrane, a well-marked open nuclear network with several karyosomes. This nucleus is situate in an evident amount of cytoplasm (fig. 14), which may be clear or faintly granular.

In addition to the above a few plasma cells may also be seen, and we have noted one polymorphonuclear leucocyte.

Thus we consider that the cell masses (fig. 12) contain mainly cells which may be traced to *Connective Tissue* and to *Endothelial Cells*, while a few plasma cells may at times be seen.

We have now to inquire into the changes in the blood-vessels. Endarteritis, using the term in its broadest sense, is to be seen in many places (figs. 14 and 15), being indicated by the inward proliferation of the endothelial cells (fig. 20), and also all stages of periarteritis (fig. 16) can be seen.

There is, however, another curious phenomenon to be observed in blood, and apparently also in lymph vessels, and this is clotting (fig. 17 and the lower right-hand illustration in fig. 14). The earliest stage which we have observed was in a small bloodvessel in which some red cells were caught and held by the endothelium of the vessel, leaving the central passage free. All the clots we have observed appear to be composed of fibrin, with often a little passage on one side, in which sometimes a blood corpuscle may be seen. These clots may become organized (fig. 13).

In contradistinction to these closing or closed vessels dilated capillaries and vessels may be seen (figs. 9, 11, 12, and 19).

There are, therefore, two processes at work in the vessels, blood and lymph, viz., an obstructive and dilatative, and all these vessels are in intimate relationship with the cellular exudate.

Ætiology.—The woman suffering from the above complaint was apparently in excellent health. She had not suffered from syphilis, and the action of arsenic taken internally or applied externally appeared to be completely excluded.

We have investigated the various substances which she uses in her trade, and we see no reason why any of them *per se* should have brought about the disease, and we support this by her statement that the disease has only been present for a few months, while she has worked at her trade for years.

We have inquired into the condition of the hands in other female barbers, and have failed to find a similar condition, which they say is unknown to them.

Again, she is not the only known case of the disease, as will be indicated below, and as the others were not barbers, anything in this line may be excluded.

However, a disease somewhat resembling this in character, as will be detailed below, is known to be caused by the administration of arsenic.

If Plate XLVIII, fig. 90, of Jacobi and Pringle's Dermatochromes be examined by means of a lens, it will be seen that the eruption depicted is not altogether unlike that which we are describing.

The text referring to this illustration is a little confused as it is mentioned as fig. 89, which is an obvious misprint; excluding this, it states:—

"Arsenical keratosis . . . . in which the palms are covered with thick dirty-grayish horny masses, among them being very numerous cornified spines originating round the orifices of the sweat ducts."

Crocker, on page 427 of his well-known "Diseases of the Skin," Third Edition, with reference to arsenic, states:—

"Keratosis or thickening of the horny layers of the palms and soles begins round the sweat follicles, so that the surface is covered with small, nodular, shagreen-like or warty thickenings. Gradually the intervals are filled up, and uniform thickening of the horny layer or keratosis is established just like the congenital form."

If it be admitted that the internal administration of arsenic can cause an eruption resembling the one which we are investigating, then it is obvious that the present case may be due to an internal and not to an external cause, i.e., probably something absorbed from the alimentary tract or to some metabolic change, a point supported by the pathological histology, but further than this we cannot go at present.

Pathology.—If it is admitted that the causal agent is internal, then the pathology is obvious, as it apparently acts upon the endothelial cells of the walls of the blood and lymph capillaries and thereby causes:—

A.—Dilatation of the vessels producing increased flow of blood and lymph, and thereby helping to produce those changes in the prickle cells which cause a hyperkeratosis.

B.—Proliferation of the endothelial cells leading to:—

(1) Endarteritis (used in its widest sense to include venous and lymph as well as arterial vessels).

(2) Clotting and subsequent organization of the clot in blood and lymph vessels causing considerable secondary dilatation of lymph vessels, and also exudation into connective tissue fibres with alteration of staining properties.

(3) Periarteritis.

(4) Cellular exudate.

From the vessels it may be excreted by the skin, thus influencing the metabolism of the cells of the *Rete Malpighii*, or it may be excreted by the sweat apparatus, as the vessels around them are dilated and may thus cause:—

A.—Irritation of the walls of the sweat ducts and proliferation of the cells.

B.—Welding together of the hyperkeratosic cells near the openings of ducts, thereby causing blockage (fig. 7) and the formation of the corn-like masses over the closed ducts (figs. 5 and 6). This blockage of the peripheral parts of the sweat ducts causes dilatation (fig. 7) of the deeper parts of the corresponding ducts in the horny layer and exudation into the hyperkeratosic layers (fig. 10). This exudation in its turn brings about a loosening of the corn-like mass at first merely laterally (fig. 4), but subsequently entirely, so that it falls out and leaves a hollow (fig. 3), which eventually fills up from below.

It must, however, be carefully noted that the above is merely brought forward as a working hypothesis, as it is not possible for us at the present time to get hold of the woman so as to attempt to test this hypothesis, and when she was available we had not worked the disease out to this point.

Comparisons.—It is now necessary to try to find out what other observations have been made with regard to diseases of a nature more or less similar to the one described above, and it appears to us that these are classifiable into those known to be due to arsenic and those in which this drug is not known to have been administered.

Arsenical Cases.—The literature available in Khartoum has not enabled us to refer to the general review of cases of "Arsenical Keratosis of the Palms and Soles," written by Pringle in 1891, nor to the subsequent reports by Colcott Fox in 1893, Hardaway also in 1893, Morris in 1894, Payne in 1895 and 1897, and Mackenzie in 1896. Nor have we seen Meneau's analysis of types of arsenical dermatoses, nor Hamburger's study of the histology published in 1900.

It would appear that Sir Erasmus Wilson and Sir Jonathan Hutchinson were the observers who first drew attention to the relationship between arsenic and hyperkeratosis of the palms of the hands and feet, and since their time accounts have been given in several books. Pringle and Crocker's descriptions have been given above, while Jonathan Hutchinson's account in 1911 in Allbutt and Rolleston's "System of Medicine" states that the hands and feet on both aspects are the favourite regions to be affected, little callosities or hard, dry warts forming here and there, while the intervening patches of skin are abnormally dry, rough, and leathery.

Adamson in 1908 showed a case at the Dermatological Section of the Royal Society of Medicine in which the palms and soles showed considerable thickening of the epidermis in the form of crowded, flattened, warty growths, and on the dorsal surfaces of the fingers and toes there are numerous flat, isolated, warty growths.

The appearances which we have depicted and described are not warty but more of the nature of corns, but even this possible difference is removed by Macleod in 1903, when he stated:—

"Certain drugs which are eliminated in the sweat in their passage through the epidermis cause a hyperkeratosis. This is peculiarly the case with arsenic. The administration of a few grains of arsenious acid may be followed by a hyperkeratosis of the palms and soles . . . in addition to this pigmentation the skin becomes harsh and thickened from hyperkeratosis, and hard, horny growths like corns may develop in it."

There is, therefore, no doubt that there is a general similarity between the cases of hyperkeratosis of the palms and soles due to arsenic and the case we are describing, because:—

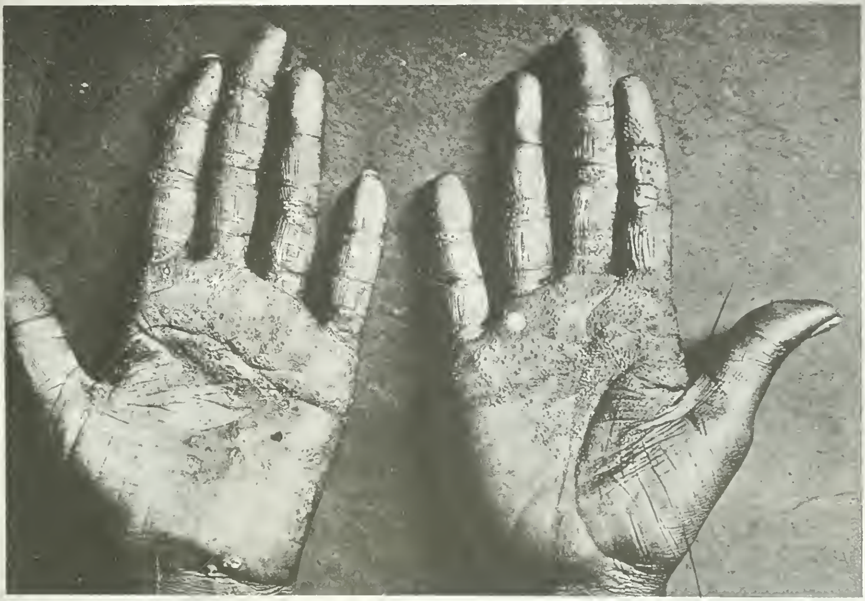
(1) Both produce corn-like punctations and hyperkeratosis, if Macleod's description of the arsenical condition be accepted.

(2) In both, if Crocker's description of the arsenical condition be accepted, the keratosis is associated with the sweat openings.

There is one clinical difference, viz., that we have been unable to find any description of the arsenical corn dropping out and leaving a crateriform depression.

It is also curious that in both diseases the study of the histology should be so defective, there being, as far as we know, only one description of the

PLATE I.



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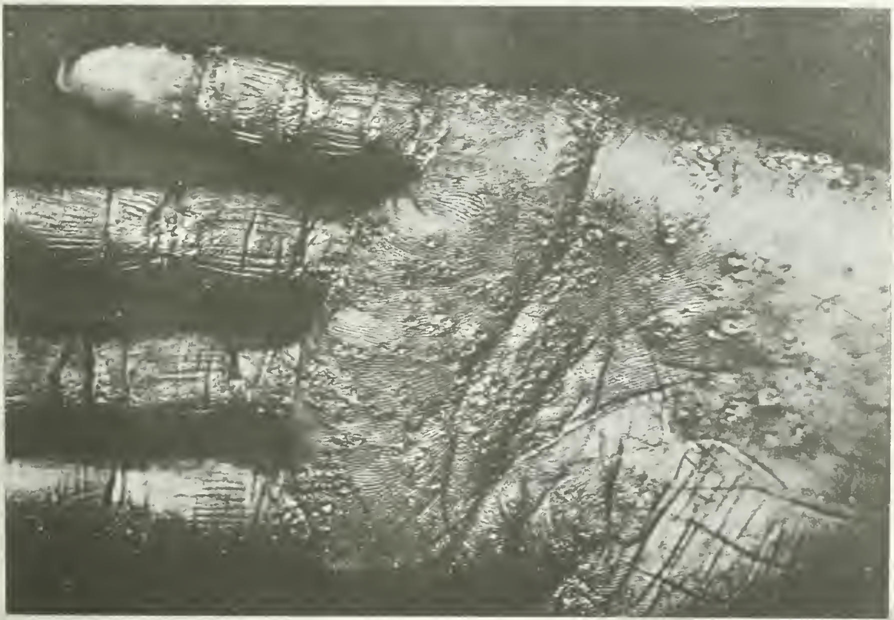

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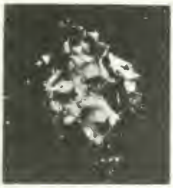

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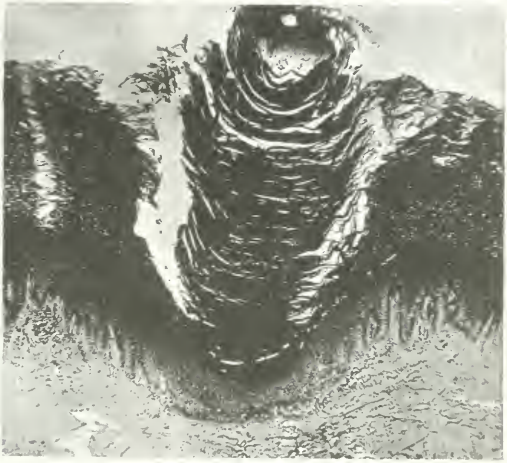

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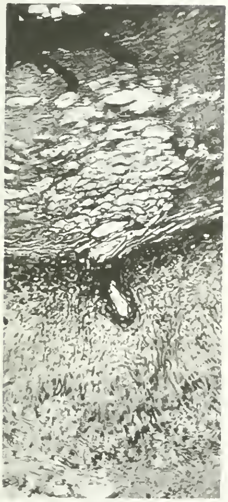

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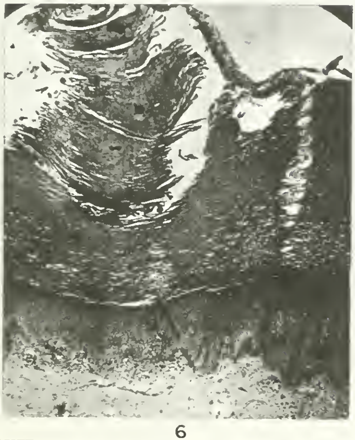

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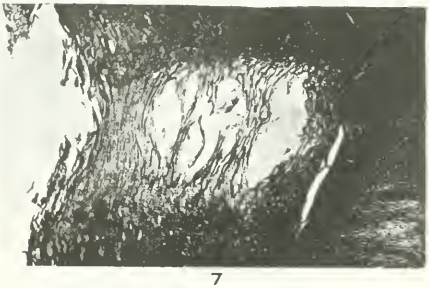

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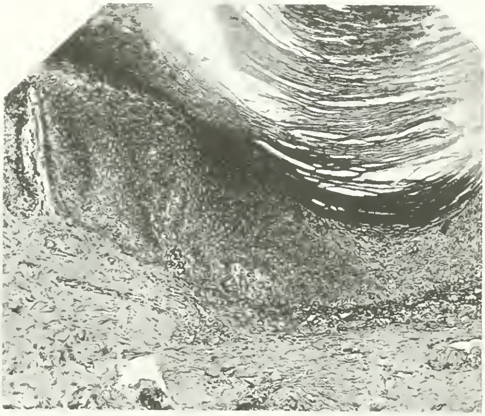

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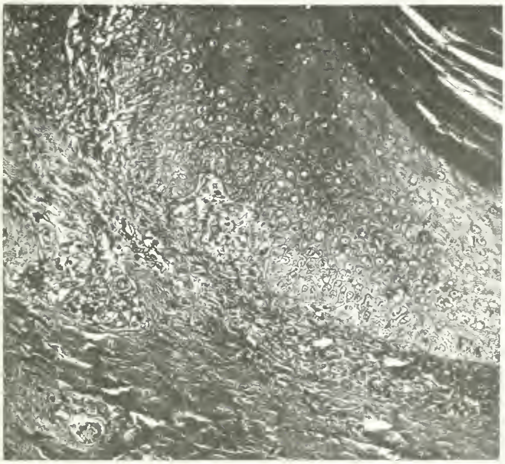
To illustrate paper, "Keratodermia punctata," by Albert J. Chalmers, M.D., F.R.C.S., D.P.H., and

PLATE III.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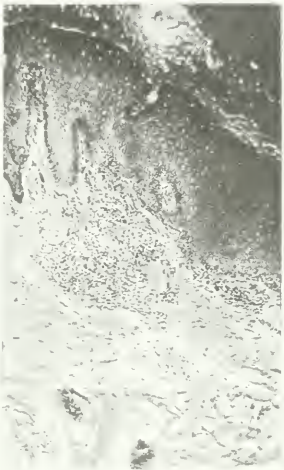
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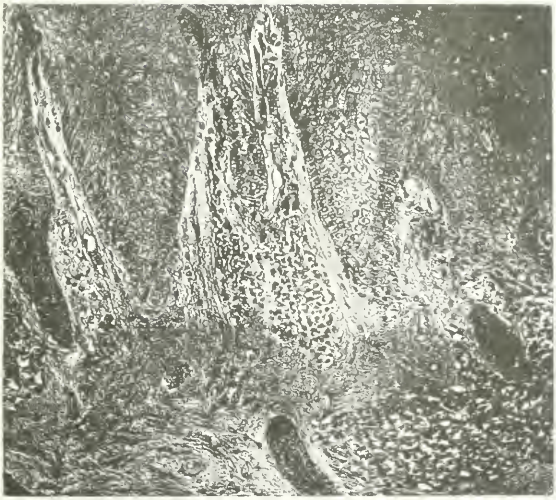
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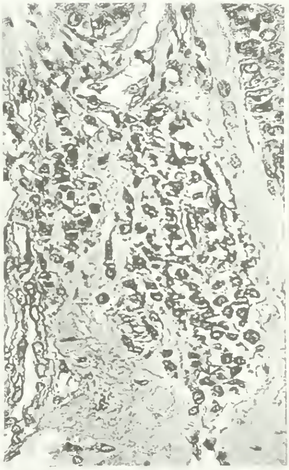
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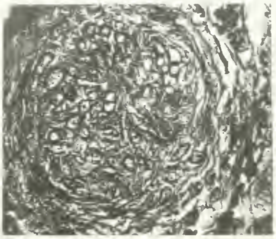
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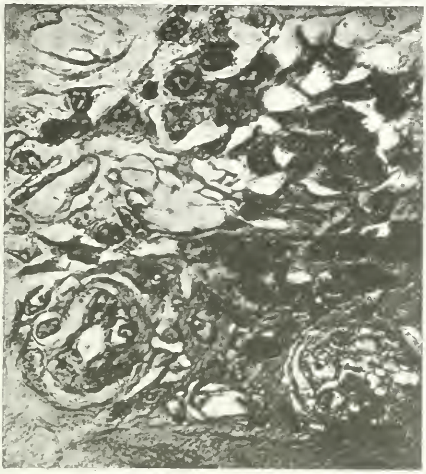
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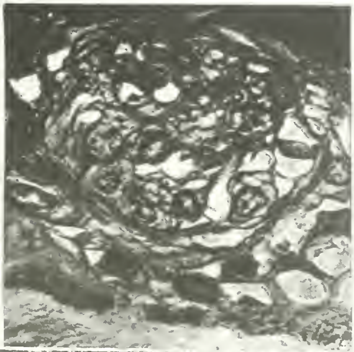
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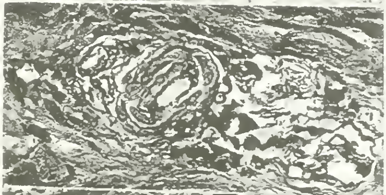
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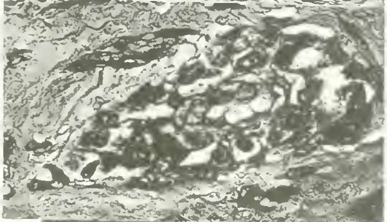
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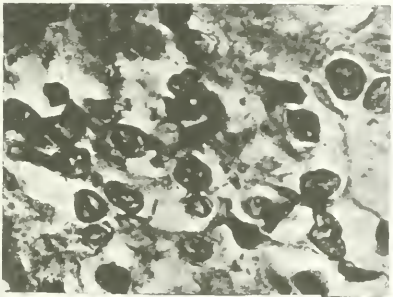
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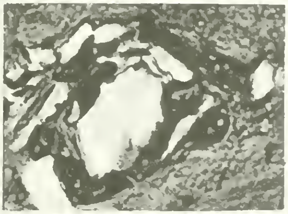
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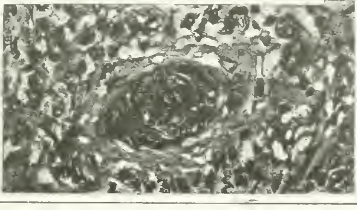
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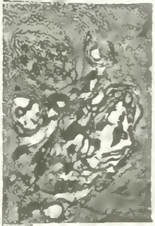
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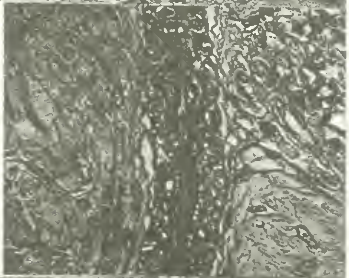
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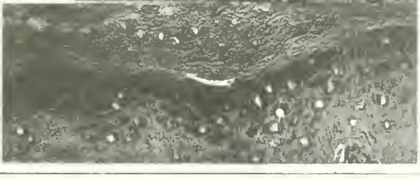
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To illustrate paper, "Keratodermia punctata," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and Sagh (Major) A. KAMAR,

histology of the arsenical cases, viz., Hamburger's, to which we have been unable to refer, and of the non-arsenical cases only Mantoux's, which we have studied carefully.

Nevertheless, pending further investigation we feel that the arsenical and non-arsenical diseases have much in common, and are probably allied pathological conditions brought about by different toxic agents.

Non-arsenical Cases.—In a paper on such a case published by Mantoux in 1903, under the heading "Porokeratose Papillomateuse Palmaire et Plantaire," he and subsequent writers refer to a model in the museum of the Hospital of St. Louis which represents a case from Besnier's clinic. Besnier did not give a clinical description of this case, but Mantoux's account of the model leaves no doubt that it represents the condition which we are describing. Balzer and Germain in 1905 mentioned the fact that one of them made a histological examination of the epidermis of this case, which showed that the corn-like masses were composed of the horny epidermis partially dissociated and situate at the orifices of the sweat ducts.

It was on the strength of this case that Besnier founded one of his four kinds of Keratodermia palmaris and plantaris, viz., the one in which the initial lesions are localized in the orifices of the sweat ducts. There is, however, no clinical history available as to whether this patient had or had not been taking arsenic.

The second case with which we are acquainted is that published in 1891 by Hallopeau and Claisse, who looked upon it as a form of nævus arising in adolescence; but they make no remark as to whether the patient, a man of 30 years of age, had received arsenical treatment when the disease began, i.e., when he was 12 years of age.

The third case is Mantoux's, already mentioned above, and again there is no mention of arsenic, although he draws attention to analogous but not identical clinical cases found in (1) syphilis, acquired and congenital; (2) Lichen planus; (3) Darier's disease; (4) nævus; but, as he points out, they differ in not showing the clear translucent cornified grains, in the dropping out of the cornified grain, and in the loss of substance implied thereby.

His histological description agrees with ours in the corn-like mass, in its fixation to the Rete, and in the lateral bending of the papillæ, but he does not illustrate or describe the corium.

However, he met with an island or islands of papillary corium in the corn-like mass, and these showed dilated vessels and extravasated blood, hence his name "papillary," but papillæ do not grow out in the horny layer; on the contrary, it is the cells of *Stratum Germinativum* and of *Rete Malpighii* which, growing downwards into the corium, bring about this change in position.

Mantoux was inclined to the view that the disease was parasitic, but failed to discover any parasites.

The fourth case was reported by De Beurmann and Gougerot in 1905, but again no mention was made of arsenic, notwithstanding the fact that the man had suffered from eczema.

The fifth case is that described by Balzer and Germain, and their patient had suffered from some form of skin disease prior to the appearance of the eruption which we are considering.

Pringle and Adamson draw attention to Thibierge's cases of disseminated congenital porokeratosis, which they classify together with the above cases under the heading "Punctate Keratosis." We have been unable to see Thibierge's original writings.

At the time that some of these authors wrote arsenical keratosis of the palms and soles was well known. It is to be regretted that they did not exclude the possibility of the action of the drug which, one would imagine, they must have considered.

It does not appear possible to connect our present case with the action of arsenic internally or externally, and therefore it may be that there is a non-arsenical causation at present unknown, and this is supported by the fact that there are some slight clinical differences between the arsenical and non-arsenical case, e.g., the corn-like masses fall out in the latter, leaving the pitted appearance depicted in figs. 1 and 2, which is not described or figured in the former type of the affection.

Therefore, although the arsenical and non-arsenical types appear to be closely related, still we are not justified, until further information is available, in considering that all these cases are simply due to arsenic, but must admit the possibility of other chemical substances, probably of metabolic origin, acting in a like manner to arsenic.

Classification.—There can be no doubt that the disease in question is a hyperkeratosis, because the cells of its horny layer have a greater coherence than normal, and tend to pile themselves up in the form of horny areas.

Turning now to the classification suggested by Chalmers and Atiyah, the arsenical type would come under their *Secondary Hyperkeratoses*, and would, therefore, be separable from the non-arsenical type, as is borne out by the clinical description.

The case which we are describing appears to be unassociated with any other disease, and would, therefore, be classified in the above scheme as a *Primary Keratosis*, and as it is not generalized but localized, and is also non-follicular in origin, would come under the heading of the Primary Localized Non-follicular Hyperkeratoses, of which Chalmers and Atiyah recognized three divisions:—

(a) Keratodermias.
(b) Angiokeratodermias.
(c) Acanthokeratodermias.

As our histological sections show neither the marked vascular dilatation of an Angiokeratodermia nor the acanthosis of an Acanthokeratodermia, it is obvious that it must be classified as a Keratodermia, which may be considered as a localized non-follicular primary hyperkeratosis without marked acanthosis, and without markedly dilated papillary vessels. This brings it into close relationship with

Clavus (Corns), and indeed the histological appearance depicted in fig. 4 has certain rough resemblances to fig. 30 on page 869 of Walker's translation of Unna's "Histopathology of the Diseases of the Skin."

It is, however, easily separable from the Clavus by the changes in the Corium and by the association with the sweat passages, which is probably by no means accidental.

It has been customary to call any keratosis associated with the openings of the sweat canals by the name "*Porokeratosis*," and indeed a whole series of affections could be grouped under this name, viz., Arsenical Porokeratosis, Punctate Porokeratosis, the Porokeratosis of Mibelli, &c.

Porokeratosis was first used for the disease described by Mibelli and by Respighi, and this name has become more or less established in medical literature, and refers to quite a different disease to that which we are considering, and an affection which might well be termed an *Acanthokeratodermia*, as it comes under that heading.

The disease we are describing is, however, a Keratodermia, and is clinically associated with corn-like punctations visible to the naked eye, and therefore, adopting Pringle and Adamson's nomenclature, it appears to us that the best name for the complaint is *Keratodermia Punctata*, as this defines its classification and clinical characters, and also points to its relationship histologically with Clavus.

Diagnosis.—The characteristic features of *Keratodermia Punctata* are the formation of corn-like hyperkeratosic punctations, preceded by small, translucent, cupola-shaped swellings which may exude fluid, and which are formed in association with the orifices of the sweat ducts.

The corn-like punctations become loosened and fall out, leaving pits or depressions which fill up and form horny patches, on which the sweat pores are patent.

With regard to the *differential diagnosis*, this has to be made from the various other known forms of hyperkeratosis.

It can be separated from the generalized and from the localized follicular hyperkeratosis in being localized and non-follicular, but it requires careful differentiation from the other palmar hyperkeratoses, whether secondary or primary.

It can be distinguished from Tylosis palmæ et plantæ, from Mal de Meleda, and from Acanthokeratodermia Præcornufaciens, from Clavus and Callus, in being especially connected with the orifices of the sweat ducts.

It is more difficult to distinguish it from the hyperkeratoses associated with the orifices of the sweat ducts. The hyperkeratoses of the palms and soles with which we are acquainted which begin in this manner are:—

(1) Arsenical hyperkeratosis.
(2) Porokeratosis of Mibelli.
(3) Syphilitic hyperkeratosis.
(4) Hyperkeratosis found in Lichen planus.
(5) Hyperkeratosis found in Darier's disease.
(6) Hyperkeratosis found associated with the curious disease, called by Emery, Gaston, and Nicholas, Verrues familiales héréditaires avec dyskératoses systématisées.
(7) Linear Nævus.

With regard to the last five Mantoux ably studied the differential diagnostic points.

With regard to *Arsenical Hyperkeratosis* it is difficult to draw clinical differences, but the principal feature appears to be the lack of formation of the pits or depressions formed by the falling off of the corn-like punctations.

It is easily separable from the *Porokeratosis of Mibelli* by the absence of the circumscribing ridge, and by the presence of many corn-like punctations and the depressions due to the same.

It is to be distinguished from the *Porokeratosic form of Syphilitic Hyperkeratosis* of the palms, and from the remaining forms mentioned above by the formation of the clear cupola-like bodies, by the loss of the corn-like punctations, and by the formation of the depressions.

From this analysis we may conclude that *Keratodermia Punctata*, though closely allied to a number of types of *Porokeratosic Hyperkeratoses*, can, however, be distinguished from them, and is therefore worthy of consideration as a separate skin affection.

Treatment.—We first attempted to treat this case by providing her with indiarubber gloves to use when employed at her work. This she found to be useless and gave up her profession entirely, and as this failed to cure her we tried local applications of salicylic acid in collodium, because Balzer and Germain found an ointment of resorcin 1 in 10 to 1 in 15 to be of use. So far we have not heard of the result of this treatment.

If it fails, and if we can keep in touch with the woman, we propose to try the effects of intestinal disinfection, as the disease seems to be of chemical origin.

Summary.—There exists a hyperkeratosis of the palms and soles which is capable of being acquired at any period of life and by both sexes, and which is characterized by commencing around the orifices of the sweat ducts, which it blocks, causing the appearance of a translucent pompholygic-like lesion, in connection with which a corn-like punctation forms. This punctation can fall out and give rise to a depression which fills up with horny cells, and joining with similar areas causes hyperkeratosic patches to appear on the palms of the hands. On these patches the sweat openings are patent.

The disease does not appear to be arsenical in origin, and seems to differ from the other known forms of porokeratosic hyperkeratosis of the palms and the soles. Its causation is apparently chemical substances acting upon the skin, and probably coming from some metabolic changes taking place in the body or absorbed from the alimentary canal.

There is not much known as to the treatment, but disinfection of the alimentary canal, combined with applications of salicylic acid or resorcin locally, appears to be worthy of a trial.

Acknowledgments.—We beg to acknowledge with thanks the interest which Lieutenant-Colonel Carroll, D.S.O., Principal Medical Officer of the Egyptian Army; Captain Archibald, D.S.O., Pathologist to these laboratories; and Captain Innes have taken in this work.

We have also to acknowledge most gratefully the kind help received from Dr. Christopherson, F.R.C.P., Director of the Khartoum and Omdurman Civil Hospitals.

Khartoum,
February 21, 1917.

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ILLUSTRATIONS.

(These photographs may, with advantage, be examined by means of a lens.)

PLATE I.

FIG. 1.—General view of the palms of the hands to show the nature of the eruption. Note the small area near the base of the ring finger of the right hand. This indicates the site of the epidermal shaving shown in fig. 3. Photograph.

FIG. 2.—The palm of the left hand to show the general character of the eruption in greater detail. Photograph.

PLATE II.

FIG. 3.—Epidermal shaving from the site indicated in fig. 1. Note three corn-like punctations and one aperture indicating the site from which one corn-like punctation has fallen. × 4 diameters. Photograph.

FIG. 4.—Section through a piece of the hyperkeratosic skin removed from the ulnar side of the left hand. Note the sweat duct piercing the horny layers and the section of a corn-like punctation similar to those depicted in fig. 3. Note the depression in epithelium and the cellular exudate in the papillary and subpapillary layers of the corium. × 30 diameters. Photomicrograph.

FIG. 5.—Portion of a section of the same piece of skin as that from which fig. 4 and the other figures are taken. It shows a sweat duct in the rete Malpighii and its continuation into the stratum granulosum and stratum corneum, in the latter of which it is blocked by the base of a corn-like punctation. × 128 diameters. Photomicrograph.

FIG. 6.—This section shows more clearly the blocking of a sweat duct by a punctation and also the passage of a neighbouring duct through the horny layer. × 35 diameters. Photomicrograph.

FIG. 7.—For purposes of economizing space this photograph is placed on its side. It depicts the dilatation of a sweat duct caused by the superficial keratosic block. × 70 diameters. Photomicrograph.

FIG. 8.—This photograph shows the lower part of a keratosic punctation in which the remains of nuclei can still be seen. The stratum granulosum is well shown on the left side but is absent below the punctation, while the rete Malpighii is beginning to be depressed just below the keratosic mass. The subpapillary and papillary cellular exudate is clearly visible. × 70 diameters. Photomicrograph.

PLATE III.

FIG 9. — This illustration shows the subpapillary and papillary exudate. × 160 diameters. Photomicrograph.

FIG. 10.—Note the exudate in the corium and particularly note the mass of cells in the pars recticularis. × 70 diameters. Photomicrograph.

FIG. 11.—This figure shows the cellular exudate in the papillary and in the subpapillary layers of the corium, as well as the dilated vessels, and it also indicates the relationship of the sweat ducts to the cellular exudate. × 160 diameters. Photomicrograph.

FIG. 12.—Cellular exudate below a papilla. Note the dilated vessels. × 340 diameters. Photomicrograph.

FIG. 13.—Organization of the clot in a closed vessel. × 500 diameters. Photomicrograph.

PLATE IV.

FIG. 14.—Cellular exudate with a vessel containing a clot on the right lower corner and another showing endarteritis on the left lower corner. × 750 diameters. Photomicrograph.

FIG. 15.—Endarteritis obliterans. × 1,000 diameters. Photomicrograph.

FIG. 16.—Periarteritis. × 360 diameters. Photomicrograph.

FIG. 17.—Cellular exudate and closed vessel. × 560 diameters. Photomicrograph.

FIG. 18.—Cellular exudate showing mainly nuclei. × 750 diameters. Photomicrograph.

FIG. 19.—Endothelial cells sprouting outwards from a vessel. × 1,200 diameters. Photomicrograph.

FIG. 20.—Closed lymph vessel. × 340 diameters. Photomicrograph.

FIG. 21.—Transverse section of a sweat duct and surrounding cells. × 340 diameters. Photomicrograph.

FIG. 22.—Longitudinal section of a sweat duct and cellular exudate. × 340 diameters. Photomicrograph.

FIG. 23.—Stratum lucidum and stratum granulosum. × 210 diameters. Photomicrograph.

◆

HYPERTROPHY OF THE NIPPLE: A HITHERTO UNDESCRIBED SIGN OF LEPROSY IN THE MALE.[1]

By A. POWELL.

OF 302 lepers :—

Both nipples enlarged	...	237 cases	=	79	per cent.
One nipple enlarged	...	9 ,,	=	3	,,
Neither nipple enlarged	...	56 ,,	=	18	,,
Total cases	...	302 ,,	=	100	,,

The size of the nipple in the female depends on so many factors that it is of no aid to diagnosis.

As a control, 200 consecutive non-leprous males were observed. In only two—that is, 1 per cent.—was any hypertrophy comparable to that of a leper observed.

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[1] Abstracted from the *British Medical Journal*, May 19, 1917.

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THE JOURNAL OF

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June 1, 1917.

IS THE MAXIM "EARLY TO BED AND EARLY TO RISE" FOUNDED ON A SCIENTIFIC BASIS?

The writer has recently been asked to furnish an explanation of the prevalent belief that it is conducive to good work and health to follow the maxim of "early to bed and early to rise." Although a time-honoured legend the matter has never been dealt with scientifically, nor perhaps is it possible to lay down definite conclusions in a matter which is so dependent upon temperament, custom, and environment. Like most modern popular beliefs, it has been handed down to us from ancient times, and in consequence must be ascribed to long observation and to experience gained, collated, and acted upon. Being gathered from old time observations, we must refer back to the periods when civilization existed only in the East and in warmer climates than ours, and such being the case, it may be asked: Does the maxim hold good in the West and in latitudes where the climate is more temperate and the conditions different? There are many points from which the question may be approached, and to mention only a few straight away, such questions as disease, climate, economy, variation of body temperature, atmospheric states, digestion and assimilation, and cerebral conditions readily suggest themselves.

Disease.—The carriers of disease, insects and most verminous animals, become active when the sun's rays fall westerly and the heat subsides, when daylight wanes, and even when darkness prevails. The carriers being about proclaim the fact that diseases are then communicable and communicated. The one ailment that primarily suggests itself is, of course, malaria, for its communicability during twilight and darkness has been known from time immemorial. To the "night air" itself up to a few years ago the disease has been ascribed, and the night air got a bad name in consequence: mal= bad, aria = air—mal-aria, and is the term actually used for the disease itself. The curtains for our beds originated in the protection they afford against insects of all kinds, and contributed to prevent inroads of larger animals: centipedes, mice, rats, and even snakes. When curtains proved ineffectual, "box-beds"—that is, beds like cupboards built into the wall, usually placed below staircases, with wooden doors—took the place of curtains. The bed was essentially the insect, &c., protected part of the household, and only of late years has the necessity of house protection by screened windows and doors been shown to be necessary. If the house is not protected, sitting in a room in the evening and late into the night exposes the occupant to mosquito bites and to the bites and stings of other carriers of disease, and to escape these it was (and is) necessary to shelter under the mosquito-protecting net around the bed, engendering thereby early retirement as a habit. One may be (and is) met with the statement that this cannot apply to the British Isles, and what is essential in warm climates is not incumbent in a temperate climate. It is but yesterday we got rid of malaria in England, and, for that matter, from the British Isles generally. In the girlhood of our grandmothers—or, in other words, in the beginning of last century—malaria was prevalent in many places, and at a yet earlier date universal in Britain. Even our mothers declared that the night air was "bad," and would not open their windows at night. They were taught by their mothers that it was so, and our grandmothers were right, for as yet the low-lying parts of England were undrained, and mosquito-breeding swamps abounded. It is needless to labour this point, which is self-evident; no more is it necessary to point out that the muslin window curtain by day was introduced as the protection against flies and the diseases by day as the bed curtain did by night; that the universality of the geranium as a window decoration, as pointed out by Sambon, was a deterrent to fly incursions, for insects shun its neighbourhood, no doubt because they find its perfume objectionable or wholly deleterious. These claims, of what may be held to be ancient history by the modern town dwellers, will not, however, bring home to them why the habit and benefit of early retirement should hold good now, for malaria is unknown amongst us. But customs last long after even the cause of their origin has disappeared, so that the cause of the continuance of the "early to bed" belief requires other elucidation.

Economy.—Late sitting means extra lighting, often a late supper, more expenditure in heating, and frequently increased consumption of tobacco and alcohol.

Hunger, when the late sitter goes to bed, is often a cause of insomnia. An empty stomach means an active brain state, provided no alcohol has been taken, and with an active brain sleep, even when it occurs, is often unsatisfactory, being light, mere dozing, and anything but sound and refreshing. Hunger causes more sleeplessness than over-indulgence of food, which, although deleterious in several ways, is apt to produce deep unconsciousness, early supervening after retirement to bed. To sit up late, therefore, means either an extra meal or unrefreshing rest, an economic loss in whichever way we look at it.

The Temperature.—The tides of bodily heat rise and fall at definite periods of the day. Practically the temperature is normal twice in the twenty-four hours—i.e., 12 o'clock noon and 12 o'clock midnight. The temperature of the body in health begins to rise from about 6 a.m. to 12 noon, when it reaches the normal, and continues to rise until about 5 to 6 p.m., when it reaches its maximum, and then falls until before midnight, when it is again normal. After midnight the temperature falls gradually, until between 4 a.m. and 5 a.m. it is at its lowest. To sit late, say to after 12 midnight, the temperature is falling, the stomach is empty, and the brain takes charge. Ideas flourish, cerebral alacrity prevails, thoughts develop apace, and the pen of the writer has free scope, while the quietness of the hour aids and abets the abnormal amount of blood supplied to the brain. The morning reflections, however, are not always in keeping with the previous night's production, and the counsel to "sleep over" any rapid conclusions is a wise one. There has been a cerebral debauch productive of ideas, plans, resolutions, or conclusions which will not hold good in the light of the more sobered brain of morning, when food has been taken and the digestive apparatus attracts to its uses the excessive blood supply to the brain during the late hours of the previous night. The "midnight oil" productions require revising, and the wise man will see to it that this is done; the less wise man, who posts the productions of his pen before going to rest without waiting for the morning revision, may find himself in trouble and that his brilliant conceptions were froth.

Physically considered the late sitter is at a disadvantage. Working by artificial light is conducive to eye-strain, to headaches, and to further troubles due to working in the close air of a long occupied room with the products of coal-gas from the fire, candle, oil-lamp, or gaslight. These brilliant productions of midnight are due to the working of a brain supplied with blood laden with carbonic acid gas and other products of polluted air.

Employment.—For those engaged in muscular effort early retirement to bed is the rule, whether it be the agricultural labourer, the factory hand, the engineer, &c., or the soldier that is considered. The muscles of the lower limbs require the horizontal position in order to favour the return of the blood from their tissues, and thereby relieving the superfluities of blood in their substance and the removal of the products of their activity. By retiring early the muscular and mental states are speedily relieved, for that they have a mental as well as a muscular expenditure during their work is a factor apt to be neglected by the close student, who imagines that the skilled workman is a mere hand requiring no concentration of attention or of thought, be it an engine-driver, a carpenter, a mason, or even the labourer in the field. Their work is done in the daytime, followed by early retirement; whereas the brain worker is assumed, quite unjustifiably, to burn the midnight oil—a wrong conclusion, for neither Sir Walter Scott, Tennyson, nor any great literary man worked late at his desk.

The literary productions of the late writer are for the most part of an ephemeral kind, which, although brilliant at times, is not the kind which begets greatness in either a writer or thinker. It is for this reason that specialities require a man's whole time; the writer who is doing something else that completely absorbs his attention cannot become a literary man in the true sense of the word. Such men may give snatches of good work, but cannot go beyond that. The real literary worker is a daytime not a late worker, and the twilight sees his labour finished, as in the case of those whose life is spent in more muscular forms of work.

It is within the knowledge of most medical men who have watched their more intellectual colleagues work that the man who commences his work at 4 or 5 a.m. is able to bear the strain and live to a goodly age, whereas the man who continues at his desk until 3 or 4 a.m. succumbs early, and frequently drops off in the midst of a promising career.

He who goes to bed early, sleeps in a well-ventilated room, and rises on waking naturally, not by being called or by an alarm-clock, is the man who will most likely give the world the best work, and may hope to reach a healthy old age.

Annotations.

New Operation for Hypospadias.—Arthur Dean Bevan (*Journ. American Medical Association*, April 7, 1917) reports a most successful result with a new and simple operation for the formation of a new urethra in cases of hypospadias with the abnormal orifice less than 2 in. from the end of the glans. It consists, briefly, in dissecting up a large elliptical flap of skin from the under side of the penis containing the abnormal orifice near its distal end. A hole is then bored through the glans with a trocar, and the flap is drawn through by its proximal end. The edges are then sutured to the margin of the new opening, and the interior of the new urethra is thus lined with the normal epithelium. The tube thus formed is elastic and retains its patency without a catheter.

Horse Parathyroid Treatment of Post-operative Tetany (*Nederlandsch Tijdschrift voor Geneeskunde*, January 13).—A young woman had typical post-operative tetany after thyroidectomy before she had left the table. The tetany was treated with fresh parathyroids from the horse, placed in sterile physiologic solution as soon as they were separated out, and served mixed with the food at the earliest possible moment. The electric reactions, the elimination of creatinin in the urine, and the patient's general condition were kept under constant supervision, and no drugs of any kind were given. An extremely favourable influence from this parathyroid treatment was evident, but it lasted only while the treatment was kept up. Consequently two parathyroid glands, just removed from two patients with exophthalmic goitre, were implanted, and this had also a favourable influence which proved durable, so that the patient is now nearly free from tetany, with full working capacity restored. Before treatment the creatinin content of the urine averaged 1,342 mg. a day. Under treatment with horse parathyroids it dropped to 612 mg. During the following month it averaged 726 mg. After the transplantation it averaged 586, and two or three months later 884 mg. When the figure was below 613 mg. the patient felt well and had no spasms. The creatinin output is thus a good index of conditions in tetany.

Studies on Thyroid (W. Edmunds, *Journ. Pathology and Bacteriology*, December, 1916).—Sixteen attempts were made to keep dogs alive after total excision of both thyroid and parathyroids by milk feeding, and, if necessary, intravenous injections of calcium lactate, but in only six cases was the treatment successful, and in them it was probably necessary, as was done, to continue the calcium feeding to prevent tremors, ataxia, convulsions and death. If the administration of calcium in milk by the mouth fails to keep off the symptoms, intravenous injections of the lactate of calcium may be given. These may or may not be successful in preventing symptoms and death; if they are, they generally succeed in the first three months or so; after that the animal may live for months or even years on the milk with added calcium. From this it would appear that after a time some change occurs in the animal, and this would seem to be a compensating hypertrophy of the pituitary. With respect to treatment, partial or complete loss of the parathyroids in thyroid operations can be treated with the parathyroid preparations now on the market. In the same way can be treated cases of disease suspected of being due to parathyroid insufficiency. An alternative, or additional, treatment is by the administration of calcium, which may succeed where parathyroid preparation fails; but it is necessary to give the calcium in large doses. Five or ten grains of lactate of calcium is of no use. Ten grains corresponds to the amount of calcium in 2 oz. of milk, and it is necessary to put the patient on a diet mainly or wholly of milk, and it may be advisable to give, in addition, intravenous injections of lactate of calcium.

Abstract.

INTERMEDIATE HOST OF *SCHISTOSOMUM MANSONI* IN VENEZUELA.

By Juan Iturbe.

Eggs of *Schistosomum mansoni* are often found in the course of coprological examinations practised in Caracas, and the parasite is seen in 20 per cent. of the autopsies.

Credit is due to Miyairi and Suzuki[1] for their pioneer work in elucidating the details of the life-cycle of *Schistosomum japonicum* from the time of entrance of the miracidia into their intermediate host up to their transformation into cercariae after passing in their evolution through different transitional phases. These cercariae, after leaving their intermediate host, swim about freely and rise to the surface, where they await a chance to attack their definitive host either by ingestion or through the skin.

The mollusc which serves as intermediate host to *Schistosomum japonicum* is a small snail of dark greyish colour which inhabits a yellowish or brownish shell coiled up into an acutely conical spiral 6 to 9 mm. in height by $2\frac{1}{2}$ to 3 mm. in breadth. The spiral shows eight to eight and a half turns around its axis, but full-grown shells exhibit two or three turns less, lost in the course of their development. The suture is deep and of brown colour; the operculum is horny, and coils toward the left; possesses gills affecting the shape of a comb; the buccal cavity is supplied with a pair of jaws and a radula in the shape of a band; the dental formula is $3 + 1 + 3$.

In the search for the intermediate host of *Schistosomum mansoni* in Caracas, in *Planorbis guadelupensis* Sowerby the entire evolution cycle of the parasite was observed, nearly all of the snails exposed to contaminated water acquiring the infection and showing by the end of the sixth week typical cercariae.

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[1] 1913. *Tokyo Med. Journ.*, No. 1836.

As infecting material muco-sanguineous stools containing large numbers of ova of *Schistosomum mansoni* were used, incubated during forty to sixty hours at 34° to 35°, after which tap water was added, and emptied then into glass jars containing specimens of the snails. When the experiment is executed as described, the miracidia abandon their reticulum sooner than otherwise, and are ready then to search for their intermediate host.

About half an hour after the snails have been in contact with the contaminated water nearly all of them may be seen moving about rapidly; the Planorbis rise to the surface of the water and then quickly descend.

A few days later there may be noticed upon examining any one of the specimens the presence of small punctiform tumefactions situated on the head, at the base of the tentacles, and in the neighbourhood of the labial commissure. These lesions correspond to the points of entrance of the miracidia.

The water was always changed on the fifth day, and left thereafter undisturbed throughout the rest of the experiment. Now and again some detritus of other snails was thrown into the jars, as the Planorbis exhibit decided cannibalistic propensities. It might be assumed that through this mechanism some uninfected specimens might serve the cercariæ as secondary intermediate hosts.

The miracidium undergoes a series of phylogenetic transformations, starting twenty-four hours after its penetration into its intermediate host. The phases of this evolution have been thoroughly studied by Miyairi and Suzuki, whose observations we have been able to corroborate in the course of our work. The miracidium loses its ectoplasmatic membrane, only the flame cells of the excretory system surviving; its size gradually increases and form conglomerates of rudimentary cells, which ultimately give rise to rediæ. Each one of the sporogenic cysts gives birth to fifty rediæ. These have an elongated or an ovular shape, and a widely open mouth and a rudimentary digestive system. In the snail's liver are numbers of extremely long and often coiled up redial tubes containing cellular masses of an elliptic shape which are future cercariæ, and exhibit a terminal protuberance, the caudate rudiment, and the mouth and acetabulum or ventral orifice in a formative state.

By the sixth or seventh week typical cercariæ may be seen, characterized by a strong tail which is *bifurcated throughout its distal third*; mouth larger than the acetabulum; its body is filled up by three pairs of round glands, and does not show any vestige of an alimentary tube. At the bottom of the oral orifice a cavity may be seen ending as a blind sac. *The pharynx is lacking.*

The measurements are as follows:—

Body:	**Length**	0,100 mm.	0,130 mm.
	Breadth	0,040 ,,	0,050 ,,
Tail:	**Length**	0,140 ,,	0,150 ,,
	Breadth	0,020 ,,	0,025 ,,
Bifurcating rami:			
	Length	0,040 ,,	0,050 ,,

These cercariæ, after abandoning their intermediate host, can be found free for at least twenty-four hours in the water containing the snails. They disappeared from the surface in two or three hours if some experimental animal was exposed to their attack.

The penetration by the cercariæ through the skin was not microscopically observed, in spite of frequent examinations of the skin of animals exposed to infection.

The animals experimented with include white mice, guinea-pigs, and new-born puppies, using the alimentary canal and the skin as routes of infection.

For the purpose of infecting through the skin, the specimens have been exposed for two or three hours to water containing snails that had been infected forty-five days previously. Two months later we were able to recover from the portal vein, in the case of two white mice, specimens of *Bilharzia mansoni*.

Most constant successes were obtained by feeding experimental animals with food which had been previously contaminated with livers of *Planorbis guadelupensis* containing large numbers of cercariæ.

P. guadelupensis Sowerby, the intermediate host of *Distomum mansoni* in Venezuela, belongs to the class *Gastropoda aquatilia*, genus *Limnæcea*. It is a snail of six spirals, reaching when adult up to 24 mm. in breadth by 7 mm. in height, whose distal extremity is not prominent. On its upper surface the spirals dip down somewhat, forming a conical depression, but its under-surface is flatter; it also possesses teeth arranged on an even alignment, and filiform tentacles.

The fully developed specimens resemble *Planorbis cumingianus* Dunker and *P. olivaceus* Spix, both indigenous to Brazil, differing, however, from them by its smaller dimensions and by the shape of its last spiral, which is not flat. The colour of those gathered in the creeks near Caracas is a yellowish brown, and of a paler hue than those found in Porto Rico. The younger snails differ from *P. bahiensis* Dunker in the contour of their last spiral, which is more convex, on account of which the upper surface appears more deeply excavated in the centre. This convexity, when viewed in bright light, gives one the impression of possessing an upper border.

The eggs of the *P. guadelupensis* are of light yellow colour, and are easy to be observed in conglomerates of from twenty to thirty, attached to the upper surface of the shell by means of a glutinous substance.

Under special laboratory conditions we have been able to produce, as previously stated, infection in *Ampullaria luteostoma* and *Planorbis cultratus*, but in our opinion these snails are not normally very prone to the infection in their natural habitat. This research proves that *P. guadelupensis* is the true intermediate host of *Schistosomum mansoni* in Caracas. This snail is found already infected in an alarming proportion in several quarters of the city.

Reviews.

THE ANIMAL PARASITES OF MAN. By H. B. Fantham, J. W. Stephens, and F. V. Theobald. $9\frac{3}{4} \times 6\frac{1}{2}$, xxxii + 900 pp. London: John Bale, Sons and Danielsson. 45s. net.

This standard work has become well known since its first publication in 1905. Recent investigations demanded what is practically a new work, particularly the part dealing with protozoa. But the whole book, including the excellent illustrations, is invaluable to all workers in modern medicine, especially in the Tropics.

The collaboration of the authors has been extremely fortunate in bringing to bear on a most difficult subject unrivalled knowledge in every branch of the subject, to produce a work which every scientific library ought to possess, and every tropical worker should be acquainted with.

A marked feature is its illustrations, 400 in number, a triumph of English printing. The bibliography and index add immeasurably to the value of the work.

THE RUSSIAN REVOLUTION AND WHO'S WHO IN RUSSIA. By Z. N. Preev. London: John Bale, Sons and Danielsson. 2s.

Everyone is interested in Russia, wherever they live, and is anxious to be informed of the causes of recent events, as well as probable and, of course, possible future movements. This book supplies just the information required to aid in understanding news as it comes to hand; the first part deals with the sudden Revolution, and throws light on any combination of Russian political forces that may eventuate. The second part supplies up-to-date information on the leading public men and political parties, especially valuable information for reference when names occur in newspapers and journals in connection with army, naval, and civil events.

PULMONARY TUBERCULOSIS IN GENERAL PRACTICE. By Halliday G. Sutherland, Consulting Tuberculosis Officer for North Marylebone. Pp. 290 + xiv. Six plates, 51 figures and charts. London: Cassell and Co. Price 10s. 6d. net.

As tuberculosis so much occupies the attention of the profession and all classes of the community, it is a privilege to have the views of an expert on the modern conception of tuberculosis as a systemic disease, with an account of interdependent methods of clinical and laboratory diagnosis and of treatment.

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Notes and News.

THE MHOWRA TREE.

To the *Journal of the Royal Society of Arts* Sir George Birdwood contributes the following:—

The extract from the *Times of India*, in the journal of May 11, is of greater interest than stay-at-home English readers may be aware. "Mhowra," or "mohwah," is the Anglo-Indian form of the popular Indian names, *mahua*, Hindi, and *moha*, Mahratti, deformed from the original Sanskrit, *madhuka*, given especially to the sapotads yielding an alcoholic spirit, and meaning trees that "cheer," "intoxicate," and "madden." The Sanskrit *mad* [our very own "mad"] occurs also in the names of other Indian trees and plants, simply because of the grandeur of the growth of the trees, or the beauty of the flowers of the plants; and in one of the names of springtide, the season of the loveliest indigenous Indian flowers; and also in one of the names of heavenly counterpart of the terrestrial River Ganges—"the Gower"—and in one of the names of the Hindu Caped; while in its duplicate form of *madaumust* it signifies "outrageousest lustiness."

There are in India at least five recognized sapotaceous *madhukas*, all of the genus Bassia, so named after Ferdinand Bassi, Curator of the Botanic Garden of Bologna, about 1774. The "shea tree," discovered by, and named after, Mungo Park, is also a Bassia. The notable feature about them all is their great independence of the terrible vicissitudes of tropical and sub-tropical climates; those in India never having been known, however scanty the rainfall, to fail in yielding an abundant harvest of flowers, which provide not only the spirit distilled from them, but a most palatable and most nourishing food, and the well-known fatty oil pressed from their large smooth seeds. For this reason, notwithstanding the value of their timber, they are never cut down by the people of India themselves until they are on the point of dying a natural death. The two widest-spread Indian species are the *Bassia latifolia* of Roxburgh, found chiefly throughout the Presidency of Bombay, and in the Province of Central India, and the *Bassia longifolia* of Linnæus of the Presidency of Madras, where it clings chiefly to its lofty western seaboard.

Nothing was more delightful when travelling in Western India, before the days of railways, than to pitch your tent in the early morning in the shadow of a thick grove of *madhukas*, except when the cold season followed on "the rains" and you set it up under the feathery foliage of the golden-tasselled *babulha* [from Sanskrit *varrara*, that is "covering tree"], the *Acacia arabica* of botanists.

Original Communications.

SEVEN-DAY FEVER IN THE ANGLO-EGYPTIAN SUDAN.

By Captain R. G. Archibald, M.B., D.S.O., R.A.M.C.
Pathologist, Wellcome Tropical Research Laboratories, Khartoum.

Contents.—*Introductory — Symptomatology — Complications—Blood Changes—Differential Leucocyte Count—The Causal Organism—Diagnosis—The Transmitting Agent—Treatment—Remarks—References.*

Introductory.—An opportunity recently occurred of carrying out some observations on a seven-day fever among British and Egyptian troops of the Sudan Western Frontier Force. This fever was also prevalent amongst the native population of the district, a total of nearly 300 cases coming under observation during a period of two months.

The fever first appeared in the middle of July, soon after the commencement of the rains, and by the end of the month had assumed almost an epidemic form amongst Europeans, Egyptians, Arabs, and Sudanese.

Symptomatology.—From evidence obtained the average incubation period was approximately six days.

In the majority of cases the onset was sudden, the patient being seized with severe pains in the head and muscles of the back, and in several instances this was associated with arthralgia of the knee-joints.

Synchronous with these symptoms there was fever, and in 30 per cent. of the cases an early and transient erythematous rash on the face, chest, and abdomen. Within a few hours of the onset the face became flushed, the conjunctiva congested, and the pains increased in severity, the temperature frequently reaching 105° F.

These initial signs and symptoms were particularly severe among the Egyptian troops. The tongue usually presented a characteristic appearance, being clean at the sides and tip, but coated on the dorsum.

A slow pulse without any signs of dicrotism was invariably present, and indeed was a special feature throughout the epidemic. The initial febrile paroxysm usually had a duration of three or four days, and was succeeded by a remission on or about the fourth day, and this in turn was followed by a terminal rise of temperature lasting two to three days, eventually falling by lysis, or crisis, on or about the seventh day, *vide* Temperature Charts. Coincident with the terminal rise of temperature there frequently appeared, in about 20 per cent. of the cases, a morbilliform rash on the arms, legs, buttocks, chest, abdomen, and dorsum. All signs of this rash usually disappeared in forty-eight hours; it was more commonly observed among Europeans than Egyptians and Sudanese; indeed, the natural pigmentation of the skin in the latter rendered the detection of either the initial or the secondary rash somewhat difficult.

None of the cases showed evidence of abdominal or respiratory symptoms, neither was there splenic enlargement nor albuminuria.

Reference has already been made to the common and characteristic type of fever present in the epidemic. Some cases, however, represented a short or abortive type of fever with a duration of three to four days, apparently similar to the three-day fever of Chitral, as described by Megaw [1]. In two instances the fever was of a continuous type, accompanied by typical signs and symptoms lasting for ten and eleven days respectively.

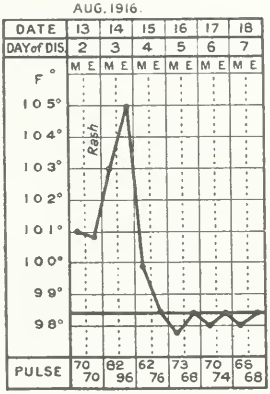

Chart I.

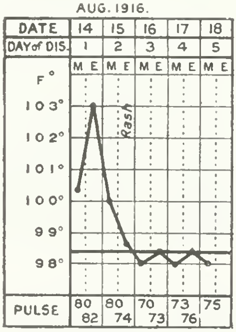

Chart II.

Complications.—These were rare. Pharyngitis was noted in two cases, while another developed keratitis following a severe conjunctivitis.

In one instance a profuse epistaxis occurred during the secondary rise of fever.

As a rule the patients made an uninterrupted recovery, and, apart from a slight degree of debility appeared little the worse. No recurrent attacks were observed.

Blood Changes.—Blood counts were carried out on several cases in different stages of the illness. All showed the presence of a definite and well-marked leucopenia; this leucopenia was evident as early as six hours after the first clinical manifestations of the disease; it increased during the course of the illness, and was most marked at the end of the third day. At the termination of the illness, when the temperature was normal, there was still a degree of leucopenia evident. Leucocyte counts were carried out on eight typical cases (Europeans), and the following results obtained: At the onset the leucocyte averaged between 3,000 and 4,000 per cm., by the end of the third day between 2,000 and 3,000 cm., and at the termination of the illness, they usually averaged 5,000 per cm.

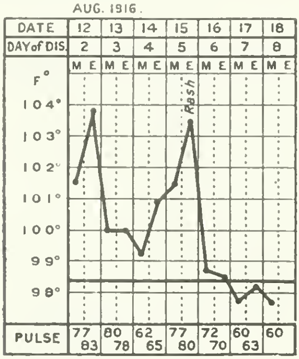

CHART III.

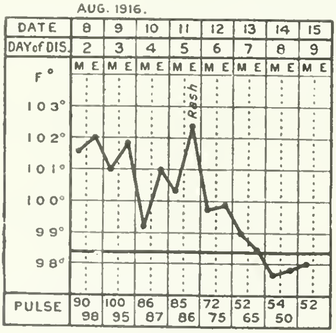

CHART IV.

Differential Leucocyte Count.—A connected series of counts showed that there was little deviation from normal in the ratios of the respective leucocytes on the first day of the illness. From the second day onwards, however, there was a steady diminution of the polymorphonuclear leucocytes, and a corresponding increase of the large mononuclears, lymphocytes, and eosinophiles, *vide* table. In a few instances an occasional myelocyte was found.

From the third day onwards many of the large mononuclear leucocytes contained vacuoles in their cell cytoplasm, while the lymphocytes, both large and small, showed extra nuclear chromatin staining granules.

In the serial differential counts the observations were made in cases occurring among Europeans, so as to avoid the possibility of the differential leucocytic ratio being previously affected by concomitant helminth or protozoal infections.

The following table shows the differential leucocyte counts from the first to the sixth day of the illness; the percentages represent the averages obtained from observations on eight different cases:—

	1st day	2nd day	3rd day	4th day	5th day	6th day
Polymorphonuclears ...	80·1	75·1	68·4	60·0	48·6	51·2
Large mononuclears .	8·1	9·45	13·7	15·6	16·4	13·6
Small lymphocytes ...	10·2	12·3	14·3	16·3	16·4	18·0
Large lymphocytes ...	1·3	1·9	1·7	3·0	3·8	6·0
Basophiles	0·3	0·3	0·5	0·2	0·8	0·4
Eosinophiles	0·1	1·8	1·9	4·9	14·0	10·8

The Causal Organism.—A large number of slides from the peripheral blood were examined, but with negative results as regards the presence of protozoa or other organisms. Blood cultures in different stages of the disease were carried out and yielded negative results.

A monkey of the species *Lasiopyga callitrichus* (I. Geoffroy 1851) received a subcutaneous injection of 2 c.c. of blood taken from an early case, and apparently suffered no ill-effects. Its blood was repeatedly examined for nine days with negative results.

Diagnosis.—The type of fever and the general clinical picture left little doubt that the epidemic was one of dengue fever; moreover, the changes noted in the blood lent additional weight to the correctness of this diagnosis. In the less typical cases where the fever was of short duration, and where the terminal rash was absent, the slow pulse and characteristic tongue assisted the diagnosis.

As already mentioned, the comparatively slow pulse was a constant clinical feature throughout the epidemic. Goldsmid and Crosse [2], in a recent paper describing an epidemic of dengue in New South Wales, draw attention to this sign, while other observers have also previously recorded it. In considering the differential diagnosis of dengue, the following diseases have to be taken into account:—

(1) *Malaria.*—Pending blood examination, some difficulty may be experienced in differentiating this fever from dengue, more especially if the latter has been ushered in by a rigor; the slow pulse and other clinical manifestations, as well as the response or otherwise to quinine therapy, will assist the diagnosis.

In many instances blood examination may not be feasible, and in such cases it is conceivable that errors in diagnosis are not infrequent, a provisional diagnosis of malaria being made, antimalarial treatment instituted, and the short duration of the fever attributed to the exhibition of quinine.

(2) *Influenza.*—The absence of respiratory signs and symptoms, the eruption, and slow pulse would help to differentiate dengue from influenza.

(3) *Yellow Fever.*—The initial symptoms of dengue simulate those of yellow fever, but the absence of jaundice, hæmorrhages, and albuminuria will serve to distinguish dengue from yellow fever.

(4) *Scarlet Fever.*—Apart from the initial erythema of dengue, there is but little similarity between dengue and scarlet fever. It should be borne in mind that convalescents from dengue fever may show obvious desquamation closely simulating that in scarlet fever.

(5) *Pappataci or Sand-fly Fever.*—This is a three-day fever without a terminal rash, otherwise its symptomatology is identical with dengue. It is still a moot point whether pappataci and dengue are closely related or are one and the same fever. The short type of dengue is really indistinguishable from that of pappataci fever.

Animal experiments may serve to differentiate the two diseases, for Chalmers and O'Farrell found that a species of monkey *L. callitrichus* (I. Geoffroy 1851) showed ill-effects from an immediate intravenous inoculation with blood taken from early cases of sand-fly fever occurring in Khartoum.

Harnett [3] in a recent paper suggests that sand-fly fever is the ordinary endemic type, but when recurring in epidemics usually assumes a more severe form with a fever lasting five or six days, and often accompanied by a terminal rash.

The Transmitting Agent.—As already mentioned, the earliest cases in this epidemic occurred shortly after the onset of the rains. At this period the only species of mosquito prevalent—indeed, the only species found was *S. fasciata* vel *calopus*, and although no feeding experiments were carried out, there was strong circumstantial evidence implicating it as the transmitting agent. This mosquito, as is well known, is both sylvan and domestic in its habitat; it was found breeding in zeers (native receptacles for storing water), shallow wells, and pools.

As a result of effective anti-mosquito measures the epidemic diminished appreciably; nevertheless, a few cases still occurred amongst the British troops, and it was apparently evident that some biting pest other than the mosquito was responsible for prolonging the epidemic among those quartered in barracks. Inspection of the barrack rooms revealed the fact that the walls were heavily infested with bugs of the species *C. lectularius*, and the occupants of the rooms admitted that they suffered from the nightly visitations of these predatory insects. As any evidence implicating other blood-sucking insects was lacking, it appeared justifiable to assume that this species of Cimex was infected with the virus of dengue, and was capable of playing a part in the rôle of transmission. Feeding experiments require to be carried out to substantiate this hypothesis, but appear worthy of trial, more especially in the light of recent evidence implicating the body louse as a transmitting agent of trench fever [4]—a fever, be it noted, with a symptomatology closely akin to that of dengue.

In the case of the Egyptian troops living under canvas, there was little doubt that stegomyia was responsible for the spread of the disease.

Previous to the epidemic a case of relapsing fever had occurred in the Egyptian battalion which necessitated the disinfection of all bedding and clothing used by the battalion, accordingly there was little opportunity for *C. lectularius* to survive in the men's kit and equipment.

As regards sand-flies, it need only be said that these never existed as a pest, a few being evident before the advent of the rains, and during the epidemic were conspicuous by their absence, consequently their significance requires no further consideration.

Treatment.—Various drugs were employed, but with indifferent success. The best results were obtained by the use of aspirin, alkalies, and salicylates.

Remarks.—Dengue fever has been previously recorded as occurring in the Sudan by Christopherson and Saigh [5], who gave a clinical account of the disease as it appeared in the Red Sea and Halfa provinces, and Balfour [6] in 1907 recorded some differential leucocyte counts enumerated from cases simulating dengue in Port Sudan. Balfour's figures are very similar to those obtained in the epidemic described in this paper. The disease has never appeared in epidemic form in Khartoum, a fact attributed, as Balfour points out, to the comparative freedom of the town from mosquitoes. At the same time there is little doubt that dengue exists as a commoner entity in the Sudan than is generally supposed.

The main points in this paper may be briefly summarized:—

(1) There recently occurred in the Sudan an epidemic of a six- to seven-day fever which clinically simulated dengue.

(2) This fever was associated with specific changes in the blood affecting chiefly the leucocytes, causing a definite leucopenia, a diminution in the number of polymorphonuclear leucocytes, and an increase in the number of large mononuclears, lymphocytes, and eosinophiles.

(3) The transmitting agent was apparently *Stegomyia fasciata.*

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THE JOURNAL OF

Tropical Medicine and Hygiene

JUNE 15, 1917.

THE CULTIVATION OF MEDICINAL PLANTS IN BRITAIN.

AMONGST other questions of national economy which have lately crept into our thoughts and designs is that of home-produced drugs from plants grown in Britain. The National Herb-growing Association has done a great deal in this direction and its efforts continue. Whether this is to become a great and useful body remains to be seen, but every help, scope and encouragement should be extended to the Association in its patriotic endeavour. We are apt to think that because a plant's usefulness was first found out in a particular country the drug must be obtained from its birthplace to attain the maximum of its usefulness. This is an argument founded on poor premises and cannot stand, for the drug may be later found in greater purity and potency in another climate or even in another continent. Moreover, the possibility of transplantation and of growing plants in a climate other than that in which they are found originally has in many instances proved to be possible and to have given us drugs in quality and quantity not inferior to the parent production. This is, however, the exception, and even when the original imported plant has maintained its qualities its progeny has degenerated; the efficiency, potency and curative property of drugs has not yet become a branch of exact science, and it is doubtful if ever it will be. It is doubtful, gauging by analogy, whether the "virtue of drugs" can be determined by chemistry as we know it to-day. Chemistry is lacking in its power of solving the qualities of wines, spirits, and of other materials, and of telling us the difference in power of synthetically produced drugs compared with the "natural" commodity. Synthetically prepared drugs, just as synthetically prepared wines, may have all the "chemist's" findings present to stamp them as correct from the laboratory point of view. They may have all the qualities capable of being detected by the palate, yet are they in no sense possessed of the "virtues" of the natural products. The hydrochloric acid produced by the human stomach, and the alcohol which the liver manufactures from the saccharine elements of our food which reaches it, are not, in spite of chemico-physiological researches, to be classed with the laboratory productions. This is a statement which the pure scientists may resent and cavil at, but one which clinicians will agree with. The process of producing the alcohol is evidently different; the liver product is used at once, the distiller's takes years to mature before it is available for consumption; yet we speak of them and incorporate them under the same chemical formula, and are content to let the matter rest there from lack of knowledge.

The disappearance of the old botanic garden of the Society of Apothecaries was regrettable from several points of view. The idea of its establishment was really that of a teaching centre where medicinal plants possible to be reared in our climate could be seen and examined by students. Few, however, visited it, and it fell gradually into neglect and finally desuetude. The garden was not a financial, but an educative attempt, and as so often in cases of the kind, it failed to attract, and the excellent idea of its founders found no enthusiastic successors. Let us hope the present attempt to grow medicinal plants will learn by its predecessor and combine the educative with the financial aspects, as thereby there is a better chance of success. Several manufacturers of drugs in this country have gardens in which some materials are cultivated on a fairly extensive scale, but the range of varieties is small, belladonna, fox-glove, lavender, dill, &c., and some other flavourings being those chiefly met with. In the cultivation of plants for medicinal purposes at home there must remain a natural tendency to hesitate at any attempt on a great scale, such as erecting houses in which the tropical plants, which yield so many potent drugs, may be reared and cultivated. It is unknown whether these artificially reared plants will continue to give us drugs similar in strength and potency. The heat and moisture of a glasshouse is not, after all, the heat and moisture of the Tropics. The sun in the former plays but a secondary place in maturing of the plant, whereas in the Tropics the direct sunlight is the potent agent in plant life, and the moisture and heat are supplementary. It is evident, therefore, that tropical plants must be cultivated in Britain by artificial means under adverse circumstances, and that therefore the drugs derived from such conservatory reared plants must be expected to be in quality or virtue of lessened, or even of but little, potency and value. It results, therefore, that it is only from plants indigenous to Britain from which we can expect to obtain medicines endowed with satisfactory potency. The whole question, therefore, resolves itself into a simple problem. It will not pay to attempt to introduce and cultivate artificially plants of warmer climates for medicinal purposes, and as the native plants are readily obtainable the reason for any elaborated scale of medicinal plant-growing is scarcely obvious.

Annotations.

Forty-nine Years a Typhoid Carrier.—The New York Health Department reports a typhoid carrier, a woman, aged 76, who had tyhpoid fever forty-nine years ago.

Lubricating Jelly (*Journ. Amer. Med. Assoc.*, May 12, 1917).—*Druggists' Circular*, September, 1915, p. 586:—

Tragacanth, whole	3 grm.
Glycerine	25 c.c.
Phenol	1·5 grm.

Distilled water, a sufficient quantity to make 300 c.c. The tragacanth is broken in small pieces, and put into a wide-mouthed bottle; the other ingredients are added and the bottle frequently shaken.

Dispense in collapsible tubes for general and gynæcologic work.

Pellagrous Intestine (K. M. Lynch, *Southern Medical Journal*, April).—In twenty-five cases examined, the only organisms recognized constantly were small yeast cells and *Blastocystis enterocola. Trichomonas intestinalis* was found in fifteen cases and *Endamœba coli* in twelve. The blastocystis, trichomonas and endamœba were limited to the large intestine, and were most numerous in the cæcum. In one case scrapings from the inflamed mucosa of the cæcum showed a large number of minute spirochætes within the cytoplasm of the epithelial cells. They were very small and active and practically filled many of the cells. They disappeared shortly on exposure, and none was found in stained sections. This observation could never be repeated. *Blastocystic enterocola* has assumed a position of interest on account of its presence in these necropsies as well as its frequency in fæces. In these necropsies it has occurred in large numbers in the inflamed portions, especially in the cæcum, and has been found throughout the large intestine. It has appeared to be particularly active when the ulcer is present. While it is considered as having no pathogenic importance, it appears to be comparable to intestinal parasites, such as endamœba or trichomonas as an indicator of the prevalence of, and liability to, fæcal contamination of the food or drink of an individual or community. No known pathogenic organism has been recognized as having any direct relationship to the "pellagrous intestine" in question.

Blastomycosis, with Stomach as Possible Port of Entry (W. F. Sihler, *Journal-Lancet*, April 8).—A case of systemic blastomycosis is described by the authors, which was peculiar in that it lacked the cutaneous and subcutaneous lesions which have been quite constant in the other reported cases, and which have led to a diagnosis. It is said to be the first reported case having recurrent ascites as a finding. A stomach ulcer with the localization of the blastomycetes in the stomach wall suggest this as a portal of entry. Blastomycetes were found in the stomach wall, liver, lymph node, urinary bladder wall, omentum, appendix, and ascitic fluid; budding forms were within and without endothelial leucocytes.

Syphilis of Stomach (P. Rockey, *Northwest Medicine*, April).—A man had a severe gastric hæmorrhage. The abdomen was opened by a median incision. On the anterior surface of the stomach near the greater curvature, about one-third of the way down from the cardia, was a large gastric ulcer, about 3 in. across, and with induration about 1 in. thick, to part of which indurated omentum was attached, from where it extended to the spleen, to which it was also adherent. On the anterior surface of the stomach near the pylorus was a small, slightly indurated ulcer scar. All intra-abdominal lymph nodes were enlarged. Above and below the stomach one could pick up a handful of these lymph nodes. Operative diagnosis, probably sýphilis. The omentum was tacked over the large ulcer as a protection, the abdominal wound was closed, and the patient put to bed. After the operation a Wassermann test was made and reported positive four plus.

Malarial Jaundice (P. Carnot, *Paris Médical*, March 3).—Malaria in varying degrees affected the liver in all forms of malaria from intermittent to remittent, hæmorrhagic and hæmoglobinuric bilious fever. The simultaneous attack by the malarial parasites on the blood, the vessels, the spleen, the liver and the kidneys readily explains the peculiar and grave character of malarial jaundice, and the hæmorrhages in hæmoglobinuria liable to accompany the jaundice.

Uræmia in Infectious Jaundice (P. Merklen and C. Lioust, *Paris Médical*, March 3).—Uræmia with benign infectious jaundice is of the type of acute hepatic uræmia. The danger is not from the large proportion of urea in the blood, but from its long continuance. A transient, even high uræmia does no harm, comparatively speaking, if the urea is promptly eliminated. If the kidneys are sound there is temporary but not permanent or serious nephritis. By keeping watch of the uræmia we can tell whether the jaundice is mild or tends to the grave type.

Intravenous Administration of Concentrated Quinine in Malaria and Hæmoglobinuric Fever (A. D. McLean, *U. S. Naval Medical Bulletin*, April).—In order to prevent alarming reactions in debilitated patients, quinine must be given intravenously in concentrated solutions—that is, 10 to 15 mils, and not in dilute solutions of 200 to 300 mils. In malaria and blackwater fever the use of concentrated solutions of quinine intravenously is the method *par excellence*. Under ordinary precautions and sterile technique the concentrated solution is practically free from danger. The attack can be cut short and terminated, the patient saved much suffering and discomfort, and in a military service much saving of money, time and services to the Governmen can be made. The results obtained are sufficient to make it not only a safe method, but by far the quickest and surest way of eliminating the malarial organisms from the system.

Wright's Solution in Conjunction with Argyrolin Treatment of Gonorrhœa (C. H. Dragoo, *U. S. Naval Medical Bulletin*, April).—Irrigations of Wright's solution with injections of argyrol (10 per cent.) have been combined by Dragoo in the treatment of acute gonococcic infections of the urethra. The many small glands which line the urethra act as a trap for the germs in gonorrhœa and make local treatment very unsatisfactory. The osmosis resulting from the irrigations would seem to flush out these glands and mechanically remove the gonococci, while the injections of argyrol serve as a germicide for any remaining cocci which resist the flushing process. The irrigations were given, with the patient sitting on a chair, with a soft rubber catheter which had been perforated in many places for about 2½ in. of its length. This was inserted into the urethra and attached to an irrigator, with the solution flowing about as in the Murphy drip method of proctoclysis. There was no pain connected with this treatment.

Spirochæte Jaundice (M. Garnier and J. Reilly, *Paris Médical*, March 3).—The diagnosis is based on results of inoculation of guinea-pigs with blood or urine from the sick, the detection of the spirochæte in the urine, and the passive immunity conferred on the guinea-pig by serum from convalescents. The spirochætes are easily seen in the urine when 10 c.c. are centrifuged and a droplet of the sediment is mixed with India ink. Or a droplet of a 2 per cent. solution of Congo red can be used to mix with a droplet of the centrifuged urine. When the smear is dry, a few drops of a 1 per cent. alcoholic solution of hydrochloride acid are dropped on it. This shows up the spirochætes white on a blue background. They have a wavy outline, the ends forming a hook. Convalescent serum usually, but not always, confers passive immunity. The usual type of this "icterogenous spirochætosis" is that of more or less grave infections jaundice with febrile relapses. In the grave form with jaundice and nervous phenomena there is more or less anuria, but coagulation of the blood is only slightly retarded. Necropsy shows the liver comparatively intact. The kidneys seem to bear the brunt of the attack. In cases of severe jaundice with acute degeneration of the liver, some primal cause other than this spirochæte seems to be responsible for the latter.

Chronic Amœbiasis in France (P. Ravaut, *Presse Médicale*, February 8).—Amœbæ are found in the stools of a large number of men who have chronic bowel trouble, often without any acute dysentery; the insidious chronic type gradually became installed. The case charts of the men record merely gastro-enteritis with anæmia, diarrhœa with general weakness, or the like. No one seems to have suspected dysentery in the first onset of trouble. The amœbæ were evidently imported by troops from Africa early in the War, and months elapsed before there was an actual epidemic from them. In the majority of cases the disease starts in the rectum and colon as usual, but the general symptoms and the frequency of metastasis in the liver render it more a general disease. Among the types encountered are those with rheumatic pains and sciatica. In all, the weakness and anæmia and recurring bowel disturbance keep up indefinitely, with occasional intermissions, unless the amœbæ is attacked with emetine and the general condition strengthened with arsenic. Men with chronic bowel trouble should be segregated in special hospitals. At present they are scattered through the hospitals or have been sent home. The amœbiasis being unrecognized, and hence untreated, keeps the man a chronic invalid.

Treatment of Malaria by Arsenic and Quinine.—Ravaut and de Kerdrel have reported the excellent results which they have obtained from treating malaria with a mixture of arsenic and quinine. Starting with the knowledge gained from the study of syphilis and amœbic dysentery, they show that the parasites causing these three diseases are possessed of common characters. They are the parasites which are encysted deeply in the organism. These chronic maladies are characterized by acute exacerbations, the result of the multiplication of these parasites and their dissemination throughout the body. So far as the treatment is concerned, it must be methodical and given in series. The combination of arsenic and quinine enhances greatly the efficacy of either agent alone. The treatment consists of ten intravenous injections of neosalvarsan from 0·15 grm. to 0·30 grm., repeated every third day. In the interval between the injections quinine is administered intravenously or by mouth. Ravaut and de Kerdrel were able to effect a cure in fifty-three cases in which all other methods of treatment had failed. They have also obtained good results in the treatment of malarial hæmaturia and gastric hæmorrhages of malarial origin. At the same time the general condition of the patient was greatly improved.

Abstract.

THE NEW YORK ACADEMY OF MEDICINE.

Section in Genito-urinary Surgery.

December 20, 1916.

A Case of Extensive Ulceration of the Bladder with a Peculiar Post-operative History.—V. C. Pedersen and E. C. Titus:—

A woman gave a history of pyelitis on the left side, treated with the usual expectant method, and cured; to relapse with hæmorrhage, tenesmus and pain, accompanied with loss of weight and cachexia, although this latter was not of the cancerous type. Cystoscopy revealed an extensive ulceration of the bladder, running along the left ureter also. The bladder was contracted and held 2½ oz. The rest of the mucosa was in a profound cystitis. Attempts were made to clear up the condition by irrigations and instillations of argyrol. After a while the cystitis was somewhat improved, but the hæmorrhage continued. It was then decided to try X-ray treatment, but the treatment had no influence on the growth, though it was continued up to June. It seemed to stop the bleeding, however.

The patient was then operated upon. The bladder was cut down upon, and liberated fairly well from its bed, and running up from both sides were a decided infiltration and a deep involvement of the lymphatics, greater on the left side than on the right. The bladder was opened and fulgurated very thoroughly. In addition to the main ulcer other ulcers were scattered over the floor, and these two or three spots tended to verify the diagnosis. After that a cystic condition developed in the anterior wall of the vagina. This was opened, and two or three drachms of fluid were withdrawn. This cyst has given no trouble since. Notwithstanding the deep ulceration, after the fulguration the bladder healed, and stayed healed. Dr. Pedersen said that he had never before seen that happen in a cancer. The woman went into the country, and was able to retain urine for two and a half hours.

Then something went wrong with the kidney, and she began to have attacks of pain. She was X-rayed for stone, and it seemed certain that there was obstruction of the left ureter. She was cystoscoped, and a clean white scar in a very satisfactory condition was found at the site of the ulceration. The right ureter seemed to have been made more patent by the cicatrization of the bladder, whereas the left seemed to have retired into a cicatrix and to be double in its outlet. An effort was made to open it, but without success, and the obstruction continued. Thirty-six hours would elapse without pain, and then an attack would occur which would send the patient to bed. The kidney was explored and found to be normal, except for congestion. When the ureter was opened 4 in. or 5 in. below the pelvis a considerable amount of purulent urine escaped. An attempt was made to pass all known forms of dilators and catheters into the bladder, and at one time it was thought that a filiform had passed, but it had turned on itself and had come out in the ureteral wound. It was finally decided not to cut the ureter across and not to transplant it into the bowel, but an opening was left as a sinus. The condition cleared up, the fever disappeared, and the opening in the loin closed down to a sinus and so remains until she goes through a mild attack of colic, when it opens itself. The patient has improved, and has made a very good recovery from two exceedingly threatening conditions.

It was proposed to make another effort to improve her condition.

A microscopic specimen was not taken from the ulcer itself, for there was so much slough that it would not have had any value, and the risk of rupturing the bladder was also great. A specimen taken from the neighbourhood was reported as only "infiltrated round cells"; the condition was not specific.

Ureteral Calculus.—A. R. Stevens:—

A man, aged 52, was admitted to hospital with a history of attacks of hæmaturia for a year. For about four months he had had occasional attacks of severe pain to the left of the umbilicus. There was no pain in the back, but apparently always at one spot in the lower left quadrant, sometimes radiating to the bladder. There was very little pus in the urine; no tubercle bacilli; no macroscopic blood, but microscopically blood was found on several occasions. X-ray examination showed no calculus. Ureteral examination showed a slight infection of both kidneys, which were of the same functional value. An attempt was made to pass a wax-tipped bougie up the left ureter, but the one employed would not go in. Other catheters would advance only 4 cm. At a subsequent examination, after some manipulation, a No. 5 bougie tip catheter was passed by the obstruction. Thorium plates were made of the ureter and pelvis of both kidneys. The right side was normal; on the left side there was some dilatation of the kidney pelvis and the ureters down to about 4 cm. from the bladder. There was apparently a vacuole in the thorium at the lower end of the dilated ureter, a large round space which allowed the X-ray to pass through without a shadow. This was the main reason for the presentation of the case, as it seemed to be an unusual radiographic feature.

The man was operated upon, and the stone in the ureter was removed extraperitoneally. An interesting point in the operation was due to the failure to get near enough to the peritoneum, so that some of the transversalis fascia was dissected away with the peritoneum, and the external iliac artery was drawn from the pelvic wall, which was rather confusing. Then by going nearer to the peritoneum the operation proceeded without difficulty. The stone was located, and an attempt was made to "milk" it up the ureter, but as this failed an incision was made over the stone and it was removed. Urine leaked from the wound for a few days. Then a catheter was passed up and left in place for a day, and at the end of two weeks urine had stopped leaking entirely. The stone was chemically pure calcium urate.

Renal Calculus with Negative Radiographic Findings.—C. Goodman presented a calculus composed of uric acid and urates which he had removed from a man in his 72nd year after no less than six ineffectual attempts had been made to radiograph the stone.

Six years ago the patient, a man, had had an attack of colicky pain in the right iliac region, which lasted about two hours, and required two hypodermics for relief. He had had no urinary symptoms. About seven months ago he had a similar attack, which was followed by hæmaturia extending over two days. During the succeeding six months these attacks became more frequent, so that shortly before the operation they were of almost daily occurrence. He complained of acute pain in the right iliac region, and had marked tenderness over the right kidney and iliac region. Examination of the urine on several occasions following these attacks of renal colic showed a large deposit of uric acid crystals. The administration of large quantities of alkaline mineral waters and alkalies did not seem to diminish the frequency of the attacks; and inasmuch as the attacks of pain had become more frequent and more intense in character, requiring large doses of morphine to control them, it was decided to operate in spite of the fact that the patient was over 70, and notwithstanding the repeated negative radiographic findings.

Owing to the marked tenderness over the kidney during the attacks and the fact that frequency of urination was not increased, it was believed that there was a stone in the pelvis which was acting as a ball valve and bringing on the attacks of pain whenever it became impacted in the upper part of the ureter. After the patient was admitted to the hospital the ureters were catheterized, but no obstruction was found up to the pelvis of the kidneys. This further strengthened the belief that a large kidney stone was the cause of the trouble. A functional test of phenolsulphonephthalein showed that the left kidney was functioning to twice the degree of the right; there was an output of 12 per cent. on the right side during the first hour, while the left showed 24 per cent. This gave assurance that the right kidney was the one involved, and that the pain was not referred from the left, as is sometimes the case in surgical conditions of the kidney.

Under local anæsthesia a lumbar incision was made, exposing the kidney, which was found to be small, with the pedicle and pelvis contracted and adherent to the surrounding structures, so that it was impossible to deliver it. In the pelvis a stone was felt. An incision was made in the anterior wall of the pelvis, and a calculus was dislodged with two tooth-like prongs which were firmly embedded in the lower pole of the kidney. Although the pelvis was not sutured, since it was important to avoid prolonging the operation unnecessarily, there was practically no leakage from the wound.

Two weeks after the operation a lobar pneumonia with rusty sputum developed, but this was followed by resolution, and the patient was discharged after five weeks' stay in the hospital.

There are many cases of nephrolithiasis which, on account of the chemical composition of the stone or for other reasons, do not give positive radiographic findings.

Renal Tuberculosis.—Dr. A. R. Stevens reported the following case:—

Case.—The patient, a man, aged 54, as far as he was aware was entirely well up to September 15, 1916. He had had no symptoms, had held his urine easily for six hours, and did not get up at night. Beginning in the middle of September, he had some frequency, and when he entered hospital on the 15th he was voiding every hour, day and night. An X-ray taken at that time showed a shadow of the lower pole of the kidney, rather hazy in definition, and with a difference in density in the different parts. Cystoscopy gave clear urine from the left kidney. At first it was not possible to pass a catheter in the right ureter. The patient was so much improved by staying in bed for a few days that he left the hospital, but he returned in two weeks with the urinary condition much worse, and was voiding frequently day and night; he also had much pain. Cystoscopy was done under spinal anæsthesia, and indigo carmine was given intravenously. A specimen of bladder wall obtained by cystoscopic forceps was lost, but it was finally possible to catheterize both ureters; the phthalein test was done later, so there were three functional tests to go by, all of which agreed fairly well, showing that the left kidney was in functional value equal to two and a half times that of the right. The left kidney gave no pus; the right gave pus and a quantity of tubercle bacilli. The therapeutic indication was then quite clear, and the right kidney was removed.

Ten days after operation the patient was able to hold his urine four and five hours. Apparently there were no symptoms until the tuberculous process broke into the pelvis.

Often a tuberculous process can be mistaken for a stone. A shadow was found on several examinations in the lower pole of the kidney, and corresponding to that shadow was a denser caseous mass at the lower pole of the kidney.

Impacted Giant Vesical Calculus.—C. Goodman:—

The patient was aged 56, and had been passing blood intermittently for over two weeks. For several days the attempt to pass water was accompanied by a great deal of pain in the region of the bladder. On this day he had not passed any urine for about twenty-four hours, and his physician attempted to catheterize him, but did not succeed in entering the bladder, and the instrumentation was followed by profuse bleeding from the urethra. He was completely prostrated, was in great agony, and was bleeding so profusely that everything about the bed was covered with blood. A catheter withdrew about 30 oz. of very bloody urine. The pain was considerably relieved, but in view of the continued bleeding the patient was removed to the hospital with the intention of opening the bladder and treating the source of the bleeding. A neoplasm was suspected, for a calculus could hardly be suspected of causing such a loss of blood.

After admission to the hospital the bladder was opened suprapubically under local anæsthesia of ½ per cent. novocain with suprarenin, and a large calculus was found impacted in the base of the bladder. In order to dislodge it and favour its delivery through the opening which had been made in the bladder, the patient was given nitrous oxide gas, and the calculus was delivered with a placental forceps. There was considerable bleeding from a large erosion of the mucous membrane of the bladder where the calculus had been embedded. This bleeding was controlled by hot irrigation. A drainage tube was then inserted and the upper part of the wound was sutured. The calculus weighed 156 grm., or approximately 5¼ oz. It was faceted corresponding to the lobes of the prostate, and had a projection corresponding to the prostatic urethra.

Three weeks after the operation a prostatic abscess involving the left lobe developed which was drained through a perineal incision, after which the patient made an uneventful recovery.

The patient volunteered the information that he had collected sixteen small calculi which he had passed at intervals during the past twelve years.

Investigations recently made on gall-stones showed that the visibility of the calculus was entirely dependable on the density of the calculus in contrast to the density of its surrounding soft parts or fluid. At the first demonstration a negative finding was obtained. Then, with the injection of thorium the calculus was brought out, but in dark shadow, which is contrary to the usual shadow of the calculus. That could only be explained on the ground that the thorium solution surrounding the calculus cast a positive shadow, while the calculus in the centre, being of such light specific gravity, did not cast any shadow at all.

Report.

A SUMMARY OF A REPORT BY LIEUTENANT-COLONEL C. M. WENYON AND CAPTAIN F. W. O'CONNOR,

ENTITLED

"An inquiry into some problems affecting the spread and incidence of intestinal protozoal infections of British troops and natives in Egypt; with special reference to the carrier question, diagnosis and treatment of amœbic dysentery, and an account of three new human intestinal protozoa."

(Part of the Report was published in *R.A.M.C. Journal*, January, 1917, *et seq.*)

EXAMINATIONS of healthy and convalescent troops in camp and such men in hospital were undertaken in order to discover how widespread were the *Entamœba histolytica* infections. Healthy troops gave a percentage of 5·3 for the *E. histolytica* carriers. Convalescent patients gave a slightly higher figure. A uniform system was adopted by which all the results are based on a single examination or on the first only of several observations. Experience shows that this is reasonably constant for comparative purposes, though it does not represent the actual carriers which would be found if repeated examinations had been made in all cases. In one series of ninety-seven men it was found that the figures given by a single examination had to be multiplied by three to approximate total carriers. It was evident that a high percentage of *E. histolytica* carriers existed amongst the troops. It was thought that the cause of the infection must be the native, and this view was confirmed by the examination in prison. Of these men 13·7 per cent. were carriers of *E. histolytica*. We have shown, not only experimentally, but by the examination of wild flies, that these insects are probably responsible in large degree for the spread of infection from the native to the newly arrived British soldier. As there are so many carriers amongst the healthy and convalescent soldiers, it is evident that it is impossible to attempt the identification of all carriers amongst a large body of men. It is likewise clear that large numbers of carriers must have been included in course of the frequent transferences of healthy troops from Egypt to England, France, and elsewhere. Similarly with the invaliding of convalescents to England an almost equal percentage of carriers is being introduced amongst them. When they reach England the majority of the convalescents have completely recovered from their dysentery or other illness.

It is evident that if a systematic examination of these men is made, carriers of *E. histolytica* will be discovered amongst them. It seems that as no examination of healthy troops can possibly be undertaken with a view to the isolation of the large number of carriers amongst them, so examination of recovered convalescents for the same purpose becomes unnecessary. The removal of the convalescents will do practically nothing to reduce the percentage of carriers amongst the healthy troops. We would advocate the examination only of such convalescents as have not completely recovered and are found to be still passing abnormal stools after proper inspection or who cannot take a full diet. A similar rule can be followed with regard to men infected with flagellates (lamblia, tetramitus, trichomonas). If the men have recovered it is unnecessary to subject the stool to microscopic examination. This need only be done in the case of men who are still passing abnormal stools or are ill in any other way and thus unfit to return to duty. Of other protozoal infections that of *E. coli* is by far the commonest. The small *E. nana* is often met with, while, of the flagellates, lamblia, tetramitus and trichomonas, the first-named is most frequently seen.

Difficulty attending the diagnosis of *E. histolytica* in the stool undoubtedly exists, and the following rules for guidance are put forward:—

(1) If amœbæ containing red blood corpuscles are present in the stool, whether evidently dysenteric or not, they are *E. histolytica*, and mean that some active dysenteric process is going on.

(2) If the actual amœbic dysenteric process is so acute as to demand immediate emetine treatment, then amœbæ with included red blood corpuscles will almost certainly be present in the stool.

(3) If amœbæ, none of which contain red blood corpuscles, are present in a dysenteric stool, then the case is either (*a*) bacillary dysentery (or other form of dysentery) with an infection of *E. coli*, or (*b*) bacillary dysentery (or other form of dysentery) occurring in a carrier case of *E. histolytica* in which there is no active dysenteric process in progress.

(4) In either case mentioned under (3) no anti-amœbic treatment is urgent, so that the case can be watched for a few days, during which encysted forms of *E. coli* or *E. histolytica* will almost certainly appear as the acute symptoms subside, and the diagnosis will be established.

(5) Amœbæ, none of which contain red blood corpuscles and which occur in non-dysenteric stools, may be either *E. coli* or *E. histolytica*. In such cases cysts are nearly always associated with the amœbæ, but, if not, treatment for the amœbic infection being never urgent or not required at all, the diagnosis can be made by daily examination extending over a few days till cysts appear, as they almost invariably do. It sometimes, though rarely, happens that amœbæ cannot be found in the stool, even after several examinations, when active amœbic ulceration of the large intestine is present.

The cysts of *E. histolytica* are, as a rule, not difficult to identify. There is, however, a greater range in size than was formerly supposed. In fact, distinct strains of *E. histolytica* exist. In some the cysts are quite small, being only 7 to 9 microns in diameter. In others the cysts are large, having a diameter of 14 to 19 microns, but most frequently the cyst measures 10 to 14 microns. The mature cyst always has a maximum of four nuclei. There cannot be any doubt that the presence of these cysts in the stool is an indication of infection with *E. histolytica* even when there has been no history of dysentery. The reasons for this condition may be tabulated thus:—

(1) Cases which are passing cysts of *E. histolytica* may relapse into acute dysentery when amœbæ with included red blood corpuscles appear in the stool.

(2) Cases of amœbic dysentery showing amœbæ with included red blood corpuscles may recover naturally, and in the process the large active amœbæ become replaced by smaller amœbæ and cysts of *E. histolytica*.

(3) Cases of acute amœbic dysentery of the above type may be cured with emetine, but they frequently relapse, as evidenced by the appearances of cysts of *E. histolytica* in the stool to be followed by an attack of acute dysentery

(4) Cysts from perfectly healthy carrier cases who have no previous history of dysentery can give rise to fatal amœbic dysentery in kittens.

Carriers of *E. histolytica* may remain infected for as long as five years, during which they may have repeated attacks of dysentery. We do not know if every *E. histolytica* carrier is doomed to dysenteric attacks, but we know that a certain percentage are. It is perfectly clear that a large percentage of men who are stationed even for a short time abroad become infected with *E. histolytica*. A certain, still unknown, though by no means negligible, percentage of these pass on to a condition of amœbic dysentery and have to be invalided from the service. It is evident, therefore, that in the transference of new troops to non-infected centres it is inadvisable to station them in the first place in endemic centres of amœbic dysentery unless important military requirements leave no other alternative. It seems possible that most individuals who become infected with *E. histolytica* do so without having any symptoms, and when they first have an attack of dysentery they have already been carriers of the amœbæ for a varying period. A few, however, appear to suffer from actual dysentery very soon after infection. Unfortunately, no definite statement can be made as to what proportion of carriers ultimately become actual dysenterics. The stool of the bacillary dysenteric, if seen in the blood and mucus stage, can generally be recognized and distinguished from that of amœbic dysentery by the great abundance of pus and other cells. The large cells, so often mistaken for amœbæ, may actually ingest red blood corpuscles.

They are probably derived from the endothelium of blood-vessels, and may be called macrophages.

The difficulty attending the recognition of unencysted *E. coli* are as great as those mentioned above for *E. histolytica*. *E. coli* may actually ingest cysts of *E. histolytica*. We could obtain no evidence, after observation on undoubted *E. coli* infections and on cases of bacillary dysentery associated with these amœbæ, that *E. coli* could ingest red blood corpuscles or that it was ever pathogenic. The cysts of *E. coli* vary greatly in size. The smallest we have seen had diameters of 13 microns. The largest measured 38 × 34 microns.

Of all the flagellates of the human intestine, lamblia has the greatest claim to pathogenicity. It may remain in the intestine for years and give rise to attacks of diarrhœa when quantities of mucus are passed. The flagellate reproduces by longitudinal division. These dividing forms have been seen for the first time. Tetramitus infections may be recognized by the finding of cysts in the stool. Infections with this flagellate and with trichomonas are very persistent, but their pathogenicity is somewhat doubtful. Two new human intestinal flagellates, *Waskia intestinalis* and *Tricercomonas intestinalis* and a new entamœba, *Entamœba nana*, are described for the first time. As far as we have been able to determine, they have no pathological significance.

TREATMENT OF E. HISTOLYTICA AND OTHER PROTOZOAL INFECTIONS.

In the treatment of *E. histolytica infections*, emetine hydrochloride has been almost exclusively used. A few cases were treated with methyl emetine sulphate. The cases were arranged in three groups according to the method of emetine administration. During the stay in hospital the stools were examined macro and microscopically every day. After treatment was finished the patient went to a convalescent depot, where he remained at least one month. During this period the stool was examined microscopically every other day. In this manner it was possible to detect a relapse as soon as it occurred. This happened in under twenty days in all cases which relapsed, with the exception of three, which relapsed in under thirty days.

Group 1.—Injection of 1 gr. of emetine each day for twelve days:—

A. *Carrier Cases.*—Fifty-two were treated; of these thirty-seven were cured, ten relapsed, and in five there was no reaction to treatment. Six of the uncured cases were eventually cured by treatment in Group 3.

B. *Acute Cases.*—Six were treated and all relapsed. One of the acute cases was eventually cured by treatment in Group 3.

In this group the carrier cases were not confined to bed and had chicken diet. The acute cases were kept in bed on dysentery diet. A sodium sulphate mixture was given regularly three or four times a day.

Group 2.—Administration of emetine by the mouth, 1 gr. daily for twelve days.

A. *Carrier Cases.*—Nine were treated; of these six were cured, two relapsed, and one did not react to treatment.

B. *Acute Cases.*—Three were treated; of these two relapsed, and one did not react to treatment.

The cases were handled as in Group 1, except that the saline was not administered so regularly.

In addition to the above, one acute case relapsed after treatment with ½ gr. of emetine by the mouth for twelve days. A carrier case did not react to 1½ gr. of emetine by the mouth for twelve days, while another was cured by orally-administered emetine, 1 gr. a day for two days, followed by ½ gr. a day for seven days. Yet another was cured by 1½ gr. a day for four days, followed by 1 gr. for eight days (oral administration).

Group 3.—Emetine 1½ gr. a day for twelve days (1 gr. injection each morning, and ½ gr. by the mouth at night in keratine-coated tablets).

A. *Carrier Cases.*—Thirty were treated, and all were cured.

B. *Acute Cases.*—Seven were treated and two were cured, while five relapsed. In this group all cases were kept in bed on milk or dysentery diet. The saline mixture was rarely given, as orally administered emetine tends to keep the bowels loose.

In thirty-seven cured cases in Group 1, the infection disappeared on an average in four days.

In thirty cured cases in Group 3, the infection disappeared on an average in two days.

From these figures it is evident that the best results are obtained by treatment as in Group 3. The carrier cases were all cured. The acute cases, with actual amœbic dysentery and generally with histories of repeated attacks, are difficult to treat successfully. It is suggested that the acute cases with tendency to relapse might be given, after the initial course, a prolonged treatment by small doses of emetine, ⅙ or even ¼ of a grain a day by the mouth.

In the handling of *E. histolytica* infections, it is not the presence of cysts which makes treatment difficult, but rather the degree and character of the ulceration of the large intestine. One of the most resistant cases never showed cysts at any time during a three months' observation while there was undoubtedly extensive ulceration of the large intestine. The latter is most marked, and has been of longest duration in the cases which give histories of repeated attacks of dysentery. It is least extensive in the healthy carriers who give no history of dysentery. There does not appear to be any evidence that inadequate emetine treatment increases the number of carriers, nor that emetine tends to make encysted forms appear in the stool. In the treatment of carrier cases it is not the cysts we attack, but the amœbæ which are producing the cysts. As far as we have been able to judge, emetine-resistant strains of *E. histolytica* do not exist.

The majority of cases of *E. histolytica* treated showed also other protozoal infections (*E. coli*, lamblia, trichomonas, tetramitus). The action of emetine on *E. histolytica* was not influenced in any way by the presence of other protozoa.

In only two cases did the emetine appear to act deleteriously on the heart. Both these cases had been given two twelve-day courses of emetine with only a few days' interval. Upon getting up after the second course both cases showed symptoms of heart trouble—shortness of breath, rapid pulse, and irregular heart action on slight exertion. The condition passed off in two or three weeks. Methylemetine sulphate was tried in three acute cases and one carrier in a twelve-day course. The dose employed was 1 gr. injection each morning and 1 gr. in keratine-coated tablet by the mouth each night. Of the acute cases two relapsed, and one did not even react to treatment. The single carrier case was cured. The methylemetine by the mouth does not cause vomiting like the emetine hydrochloride. Very little can be done in the way of ridding an individual of other protozoal infections. Emetine, when given as in Group 3 (1 gr. injection each morning and ½ gr. by the mouth at night), usually abolishes temporarily all concurrent protozoal infections. They all return later, however. Flagellate infections can generally be got rid of by means of bismuth salicylate, gr. 20, t.d.s. When the treatment is stopped after a twelve- or fifteen-day course the infections usually reappear. Prolonged treatment by this drug may give better results.

One coccidium (Isopora) infection was abolished by emetine treatment as in Group 3. There was no relapse.

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Reviews.

THE MEDICAL ANNUAL, 1917. Bristol: John Wright and Sons. 10s. net.

More than ever is this annual a necessity. So many new and difficult problems have required elucidating with consequent increase of original work that it is difficult to keep abreast of medical knowledge. But careful study of this, the thirty-fifth number, will enable everyone, in whatever part of the world they find themselves, to be possessed of the best and most reliable information from all parts of the world, especially from America, the home of many of the contributors.

JOURNAL OF HYGIENE. Plague Supplement (V). Tenth Report on Plague Investigation in India. Issued May, 1917.

T. H. Gloster, F. N. White, and others, from observations in the United Provinces of Agra and Oudh, 1911-1912, found the association of humidity during winter with plague epidemics so constant as to constitute the cause by influencing the life of rat fleas when separated from their hosts. The longer the flea survives the greater are its chances of carrying the plague bacillus either to rats or human beings. R. St. J. Brooks considers the effect on plague of "saturation deficiency," the difference between the actual tension of aqueous vapour present in the atmosphere and the tension that would be present in saturated atmosphere at the same temperature. The conclusions are:—

(1) That plague ceases to be epidemic when a temperature above 80° F. has a saturation deficiency of over ·30 of an inch.

(2) Epidemics cease even when the temperature is below 80° F. if there is a high saturation deficiency.

(3) Plague may start and continue with a temperature above 80° F. if the saturation deficiency is below ·30 of an inch.

(4) When the climate is always favourable to the start and spread of plague, the disease may occur at any time.

WHEN TO ADVISE OPERATION IN GENERAL PRACTICE. By A. Rendle Short, M.D., B.S., F.R.C.S. Lond. Pp. 279 + vi. Bristol: John Wright and Sons. London: Simpkin, Marshall. Price 5s. net.

To hesitate to operate is fatal, for most cases are urgent. Those that are chronic require more care and watchfulness to avoid unnecessary misery, protracted recovery, or a fatal ending. Many books deal with urgent emergency operations. This work, however, fills a vacant niche in surgical literature. First, it surveys the whole of surgery better than larger works; the writer is especially qualified to aid his readers with the wide ripe experience shown as editor of the "Index of Prognosis" and "End Results of Treatment." Secondly, by fixing the attention on the indications for operation it removes the tendency to hesitation by consideration of the difficulties of each operation and the complications which are liable to follow. The reader's mind is concentrated on the necessary, the special, points of diagnosis and prognosis.

The work should find a place in the library of every hospital resident, medical as well as surgical, to enable full benefit to be reaped from the advantages of their position, obtained only during a short period of their professional lives of watching patients. Everyone can have an opinion, but it is very different being able to state the exact grounds of an opinion so as to be of assistance both to experienced seniors and inexperienced juniors and dressers.

A study of the book will enable general practioners whose work comprises the wide field of medicine to revise their surgery so as to bring it up to date, then later, as emergencies arise, they can look up special points. Without casting any reflection on the knowledge of anyone, the suggestion is offered that every physician will benefit by studying the author's views to decide when a surgeon should be consulted. Also, every surgeon has his own ideas clarified so as to be able to express a considered opinion when an operation is indicated, and also when operations are too hazardous on account of the nature of the operation or the constitution of the patient.

Original Communications.

A CASE OF URINARY AMŒBIASIS WITH CYSTITIS.

By E. J. Wright, M.R.C.S.Eng., L.R.C P.Lond., D.T M.Liverpool,

West African Medical Service, Freetown, Sierra Leone.

Mrs. D., aged 26. First seen on March 2, 1917; well nourished; twenty-six weeks pregnant; fœtus living. She complained of the frequent passage of small quantities of urine followed by much very painful straining—strangury—which invariably ended in the passage of four or five drops of blood and a few drops of urine. This happened about five times every hour. She stated that on February 26, 1917, she was perfectly well, but on the next day she started frequent micturition which gradually increased in severity until it reached its present state. A specimen of urine and a vaginal smear were obtained (the smear was taken because there was a leucorrhœa, but it showed nothing abnormal). The urine was of a pale straw colour, quite turbid, small in quantity and of a neutral reaction. There was a heavy cloud of albumin; evidence of blood was confirmed by chemical test and the microscope. The urine was centrifugalized. There was a copious deposit which was coloured blood-red and occupied about one-eighth of the total volume. On microscopical examination it was found to consist of numerous blood corpuscles, both red and white, pus cells and amœbæ. The urine was examined primarily to determine if there was any nephritis. None of the amœbæ were seen in motion on this occasion, they were numerous and mostly spherical. Some cysts were noticed.

Morphology.

Dr. Young, W.A.M.S., Medical Officer in charge of Laboratory, Colonial Hospital, kindly examined some of the specimens of urine obtained from the patient, and made the following observations on the morphology of the amœbæ.

Size.—Varied from 10 to 40 microns, the largest being 40 microns long by 12 microns broad. The average measurement was 20 to 25 microns. The nucleus averaged 5 microns.

Ectoplasm.—This was very highly refractile and easily seen when a pseudopodium was protruded. It was striking to note that when compared with the numerous amœbæ found in dysenteric fæces these amœbæ had a markedly greenish ectoplasm.

Endoplasm.—Distinct from ectoplasm and granular. There were numerous vacuoles, and red cells were also seen ingested.

Nucleus.—Round, vesicular, and having a distinct nuclear membrane with interrupted chromatin masses attached thereto. A centriole was visible. As a rule the nucleus showed an eccentric position.

Motility.—Even in quite fresh specimens the amœbæ appeared quiescent except in one or two cases when an amœba would put out a blunt pseudopodium and then progress very sluggishly. Specimens put in the incubator at 37° C. did not appear activated by the heat. The moving specimens were of the large or vegetative variety.

Cysts.—These were numerous. Many were seen with two and three nuclei, but no cyst was seen with more than four. The average diameter of a cyst was about 20 to 25 microns.

Other Cellular Elements.—Red cells, white cells (not numerous), and bladder epithelium. The bladder cells were easily distinguished by their very large nuclei and lack of refractility (comparative) and their shape. No renal casts were seen. From the above characteristics one is persuaded to regard the amœbæ as belonging to the "histolytica" type.

Treatment.

The diagnosis of amœbic cystitis being made, the patient was given emetine hydrochloride 2 to 3 gr. hypodermically on March 3. This dose was repeated on the next day. On the 5th, emetine hydrochloride 1 gr. was given. On the evening of that day the patient appeared to have improved, all symptoms having lessened. When seen on the 6th her condition was worse than it had ever been: pulse small and rapid, tongue furred, and the whole body bathed in a cold perspiration. Emetine 1 gr. was given. On the 7th there was still no improvement; she was getting no sleep owing to the distressing frequency of micturition and the great pain at the end of that act. She was given emetine 1 to 2 gr. hypodermically, the bladder washed out with a weak solution of boracic acid lotion, and at the end of the wash emetine ½ gr. in ½ oz. sterile water was left in the bladder. On the 8th exactly the same treatment was repeated. Patient was now showing signs of improvement. On the 9th the same treatment was given. Condition still improving. On the 10th no special treatment was given. Condition much improved. On the 11th the bladder was washed out with a saturated solution of boracic acid. On the 12th the straining almost ceased, she complained of soreness and burning on micturition, and now passed urine about every two hours. On the 14th she was much improved, had slept well throughout the previous night, not having to get up at all to urinate. On the 15th her bladder was washed out again and emetine ½ gr. left in the bladder. The patient did not complain of any urinary trouble at all on this date. On March 16 and 17 she remained perfectly well. A specimen of urine was obtained almost every day and it was noticed that the quantity of deposit obtained by centrifugalization diminished steadily from the time when the patient's symptoms began to abate, namely, on March 8, as also did the number of amœbæ. On the 17th there was no deposit at all; on examination of the urine only one cyst, a few blood corpuscles, and many epithelial cells were found.

Remarks.

This case is mentioned particularly on account of the severe symptoms apparently caused by an amœbic infection of the bladder which responded readily to specific treatment with emetine hydrochloride. The only recorded cases of urinary amœbiasis to which it has been possible to refer are those mentioned in a paper written by Scott Macfie (*Annals of Tropical Medicine and Parasitology*, vol. x, No. 3). In all his cases it seems that the symptoms were far less urgent and distressing than in this case. The fact that the patient was pregnant and was cured of the amœbic infection by treatment with emetine without disturbance of the pregnancy supports the presumption that it does not prejudice that condition.

It would also appear from the rapidity with which the case improved that the local application of emetine is markedly efficacious.

ESPUNDIA IN THE ANGLO-EGYPTIAN SUDAN.

By Yusbashi (Captain) B. J. Susu, M.D.
Attached Sudan Medical Department, Makwar.

So far as I know, espundia, or naso-oral leishmaniasis, has only been reported in the Sudan by Dr. J. B. Christopherson, F.R.C.P., and therefore I venture to bring forward the following brief note, in which I record a second case of the same disease.

The patient is a man, J. S., aged about 55 years, and belongs to the Kunjara tribe, which lives in Darfur. He was born at Jinna, about two days' journey west of El Fasher. He left his native village when 10 years of age, and has since lived in Omdurman, Kordofan, El Dueim, and Jebel Moya, but in or about the year 1900 he settled at Sennar.

In 1914 a nodule appeared on his upper lip at the lower border of his left nostril. This nodule ulcerated, but the ulcer was generally covered by a small greyish scab, which could be peeled off, when the ulcerated surface exuded yellowish sticky serum until another scab formed.

He felt a little pain in this ulcer, but he did not consider the disease to be at all serious.

The ulcer remained quiescent for about a year, but in 1915 it began to spread in all directions, eating its way into his upper lip, his nostrils, the cartilaginous septum of the nose, the palate, and gums. This ulcerated area was covered by a large scab which almost closed his external nares.

He now began to feel a considerable amount of pain in the affected area, and this increased until he was compelled to cease his usual work as an agricultural labourer, and was obliged to live as an invalid.

On February 3 of this year he came to my clinic for the first time. His nose was then flat, and his upper lip and nostrils were covered by a large yellowish-grey to black scab, which came away easily and exposed a raw granular surface (figs. 1-3). The ulceration inside the nose was covered with muco-purulent secretion, while that on the palate appeared to be granular. The gums were spongy, granular, and bled easily, especially from the external surfaces of the lower gums. Parts of the alæ nasi and a portion of the cartilaginous septum were eaten away, while patches of the skin below his lower eyelids were distinctly œdematous on both sides.

His liver and spleen were quite normal. I made smears from scrapings of the affected region and found Leishman-Donovan bodies (fig. 4) in some abundance, and therefore I concluded that the parasite I saw was probably *Leishmania tropica* Wright 1903, varietas *americana* Laveran and Nattan-Larrier 1912, though it must be admitted that there was no obvious difference between the forms I saw and the ordinary *L. tropica*. I also concluded that the disease from which the patient was suffering was espundia or naso-oral leishmaniasis, which was first described in Peru, and subsequently in Brazil, Colombia, and other parts of South America.

It is distinct from the Indian oro-pharyngeal leishmaniasis described by Castellani, because it began on a cutaneous surface, and subsequently spread into the nose.

I am greatly indebted to Dr. A. J. Chalmers, F.R.C.S., D.P.H., for the interest and trouble he took in arranging this note for publication.

Makwar,
April 19, 1917.

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ILLUSTRATIONS.

Fig. 1.—Photograph of the patient, showing the ulceration about the anterior nares from the front. Reduced.

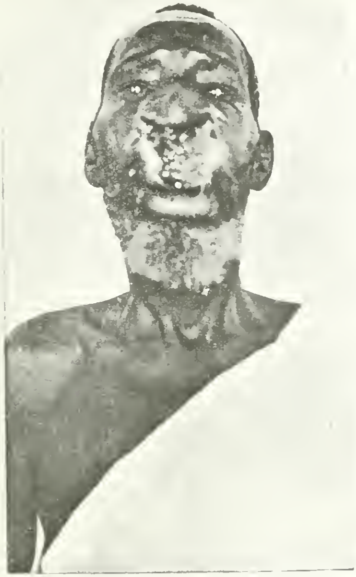
Fig. 2.—Photograph showing the ulceration from the side. Reduced.

Fig. 3.—Photograph showing the ulceration from below. Reduced.

Fig. 4.—Photomicrograph of a portion of a film made from a scraping showing one specimen of *Leishmania tropica* var. *americana*, enclosed in a leucocyte. × 1,500 diameters.

COAL IN INDIA.

That there are vast fields of coal in India is gradually coming to light; and at the present moment, owing to difficulties of sea-traffic owing to war, the importance of these sources of coal plays, and will in the future play, a decisive part in the economic life of the whole of India. In 1880 the average annual quantity of coal raised in India amounted to less than a million tons, whereas in 1915 it had risen to 17,104,000 tons. No less than 85·5 per cent. of the entire coal output of India is raised in the Raniganj and Jherria fields. Labour is a great difficulty, for at present there is no skilled mining class in India, as the majority of the workmen follow their agricultural vocations, the result being that during seed-time and harvest there is but little coal produced, as the workmen at these periods leave the mines to attend to their farms. This fluctuation in supply causes a fluctuation in price, much to the detriment of trade and manufacturing industries.



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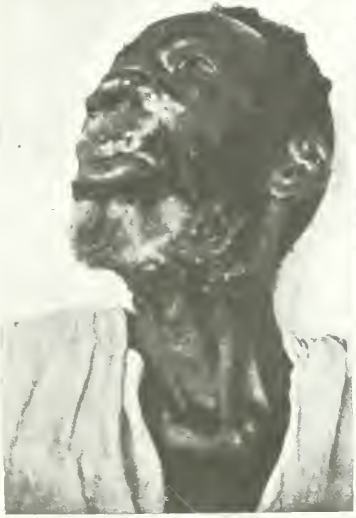

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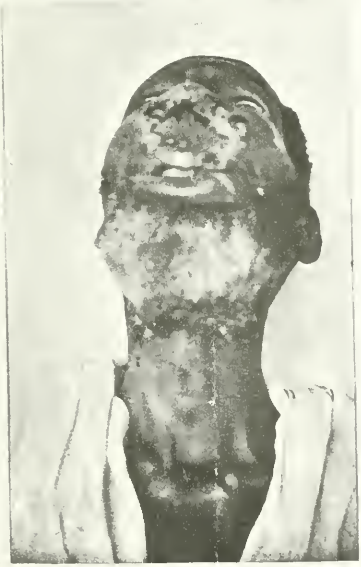

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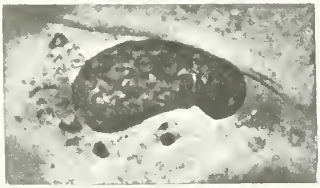

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To illustrate paper, "Espundia in the Anglo-Egyptian Sudan," by Yusbashi (Captain) B. J. Susu, M.D.

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THE JOURNAL OF

Tropical Medicine and Hygiene

July 2, 1917.

RE-EXAMINING THE UNFIT FOR THE ARMY.

The examination of recruits for the Army during the stress of war has proved a strain upon the members of the medical profession in more ways than one. In times of peace, when it is possible to pick and choose, when a man is rejected because he has lost a good many teeth, has a slight varicocele, a doubtful hernia, of a modicum of departure from normal vision, the rejection of recruits is a matter of little or no national importance. Since war began, however, and the demand for men in the Army became imperative, the time at the disposal of the medical officer to carefully examine the men who came up before him was limited to a degree. Yet in the earlier days of the War, even when men were being enlisted at the rate of sometimes 50,000 or more a week, rejection for slight defects was not uncommon—defects which later were taken no notice of as regards disability. Gradually, as more and yet more men were demanded, the stringency of medical examination for fitness relaxed, until during recent months the question was asked: "Are medical officers told to pass all who come before them, and if so, why hold a medical examination at all?" Matters came to a climax when an order was issued that all previously rejected men were to reappear for examination and to be tested as to fitness. The medical officers were placed in an awkward position. They were not now independent civilian practitioners, but clad in uniform and under orders. The demand for men was vital, and the material they had to judge were the derelicts of previous examinations, who had been rejected in many cases several times by various competent Medical Boards. They had to make selections from men of damaged physique and often of defective mental ability, with medical histories of epileptic seizures, *petit mal* attacks; digestive defects of a kind which ordinarily cripple men for their civil employment, but who yet managed to earn a livelihood under extreme difficulties; congenital deformities, such as undescended testes, a patent ductus arteriosus; discharge from the ears; heart damaged by disease or affected by "sport," especially swimming and running; and a host of anomalous conditions, defects, and lesions which are always to be found when the by-products of town life are closely investigated. In addition to these were the conscientious objectors and those who from nervousness, so-called neurasthenia, and not infrequently cowardice—more often, be it said, fancied than real.

From this category men who came with medical certificates from civilian practitioners, from consultants and specialists had to be chosen and pronounced upon. Can it be wondered at that mistakes were made, that men wholly unfit for anything but the "domestic life" they followed should have been placed in categories of a degree of efficiency for which they had previously been judged to be unsuitable on medical grounds? It was an unfair position to place medical men in; and only the strong men amongst them and those who thoroughly knew their clinical work had the courage to say yea or nay, as the case might be.

Moreover, the numbers of medical men to judge such cases were much too few; they were overworked, the time-limit for the work was such as to render careful examinations of many obscure ailments impossible; and the hours of attendance—some eight or ten hours daily—precluded a possibility of reliable work being carried out.

Lay authorities want, as we know, a definite yes or no as regards fitness, and they demand a pronouncement at once. In civil life the practitioner can as a rule, however, ask for delay from the employers of labour in coming to an instantaneous conclusion, but it would seem that military demands by laymen are more dictatorial and imperative, and "we want to know at once and now." And it takes a medical man of strong character and impressed with the power rightly placed in his hands to resist this demand, and to tell the lay authorities that medical men are not to be bought nor sold, nor dictated to in a matter in which they are the authority, and that medicine is not a mechanical art, but a science of which they are the exponents.

By many Boards and by the majority of medical men this duty to their profession, this correct attitude has been observed to their great credit and to the honour of their profession. On the other hand, there are certain Boards where the opposite too infrequently obtains—Boards where the courtesy of the majority has been seemingly cast aside, where strong language is the rule, where every man who comes up with a medical certificate is looked upon as a shirker, a cowardly funk, or an out-and-out coward, who is using a defect to escape service, and is treated, as most men would treat such men, with short shrift. All of these men have been rejected before; they present certificates from physicians—the highest in their profession—which are thrust aside and not looked at. The candidate is told "These Harley Street men don't know everything." "How much did you pay for that? I could have given you a better certificate than that for the money." "Who the —— is Sir ——? Never heard of him." "How do I know that this is genuine?" "We don't want medical reports; we are appointed by Government for this job, and I can change you from C3 to A, and if you say much more I will." These are the stories going round, and it makes one blush for one's profession to believe that it is possible for medical men to be thus spoken of, be the tales genuine or not.

The men they are examining, and by whom such remarks are recorded, are in many instances men of good standing—barristers, University graduates, and men in high commercial and other positions who are known to be physical unfits for even civil life by the foremost physicians in our land. Let us hope that these records are untrue, that the man being examined in his state of nervousness dreamt what he says, and that hope is our real belief. It will, however, take a long time to disprove these assertions; a lie, once started, it is well-nigh impossible to overtake, and it may take a lifetime for the medical profession to regain its privileged position amongst our community. So widespread is this belief, however, that disconcerting questions and statements reached publicity in the House of Commons, and though that does not prove the truth of these assertions, it casts a slur upon some medical men, and, through them, a slight upon the medical profession. It is difficult for the civil medical practitioner to grasp the fact that the status of the men following the medical profession is gauged in time of peace by the quality and behaviour of the medical men in the Army. But such is the case. In the Army, as the medical officers appear to other officers of all branches, so is the social status of the whole profession judged. That judgment until quite recent years has not been favourable; through stress and adverse criticism, however, have the officers of the Army Medical Service gradually raised the opinions of officers in other Army branches of service, and thus of the profession as a whole. The regular officers of the R.A.M.C. are at the Front gaining laurels and good opinion of their worth and capability; the civil practitioners have been for the most part doing the military work at home. Many—nay, the overwhelming majority—have acquitted themselves with honour to themselves and credit to their profession. It is galling to such men that a small minority should have been reported to have tarnished the record by forgetting that through them the whole profession is besmirched.

The poor physical wreck, frequently rejected as unfit, who may have left his bed to obey the call to be examined, and after standing shivering in a state of nudity, according to report, is spoken to in a manner which does more harm to the self-respect of the man who utters the declamatory phrases than even to the abused.

One must never forget that these medical men are overworked, that working at a rate that prevents thorough examination clouds their judgment, and that hasty words are apt to arise.

Let any surgeon or physician who has done, say, three or four hours in an out-patient room of a large hospital remember his own state of mind at the end of the time before hastily condemning even the minority referred to. Work of the kind is trying, bodily and mentally, fatigue and exhaustion ensue, and one has to grip oneself firmly to prevent giving expression to feelings which fatigue and exhaustion necessarily produce. Let us then beseech our medical men who do, not three or four hours, but eight hours' duty closely resembling out-patient work, and even much more trying, seeing that they are compelled to produce fit men out of unfit material, and contending with men whose mental states are percolated by selfish and unpatriotic feelings. Truly, loss of temper and of command of expression seem pardonable; yet will such be remembered against them and as a stain upon the magnificent work which the medical profession has done both at the Front and in the patriotic way they have responded to their country's call for home duties.

Abstract.

OSTEOCHONDRITIS DEFORMANS JUVENILIS —PERTHES' DISEASE.[1]

By V. P. Gibney.

Legg, in the *Boston Medical and Surgical Journal* for February, 1910, gave the first information of an obscure affection of the hip joint which gradually developed into a clinical entity.

Perthes in 1913 named it. Numerous writers from that time to the present have spoken of it as Perthes' disease. This surgeon in his original monograph reported on a specimen, which he had removed at operation, of cartilage and subjacent tissues from the head of the bone, as an overgrowth of abnormal cartilage, and he referred to the loss of substance in the upper epiphysis as a "peculiar atrophy," induced by a destructive process in the subchondral region. Legg of Boston found in the specimen which he examined at operation a septic focus in the femoral neck, but he regarded this as merely a coincidence and not at all responsible for the changes in the head and neck.

Delitala reported in the *American Journal of Orthopædic Surgery* for April, 1915, on six cases, and gave this conclusion: "Congenital alteration either of the epiphyseal cartilage of the upper end of the femur or of the epiphyseal nucleus which gives way to processes of ossification, which are insufficient and irregular."

The X-ray findings are quite characteristic and show in the earlier stages a slight flattening of the femoral head; a little later a lipping of the head over the neck, and at a later stage flattening of the epiphysis, sometimes leaving only the cartilage. One seldom sees any destruction of the cartilage, and this explains why so much motion is preserved and why there is so little shortening. In one of the cases which have come under my own observation, later in life, where the history obtained is unmistakably that of Perthes' disease, I have noticed a disposition to osteoarthritis—that is, lipping and some erosion of cartilage.

The symptoms resemble very closely those of tuberculous hip in early stages, but become different as the disease advances. There is reflex spasm in tuberculous hip, very little in Perthes' disease; night cries in the one and none in the other.

A typical case of Perthes' disease would be about as follows: A child between the 4th and 10th years of age begins to limp, and the mother immediately proceeds to get the history of a fall or a severe strain, but in the absence of night cries and terrors she does not consult a physician until a little adduction deformity appears. Up to this time there is very little pain, a slight trauma may induce an exacerbation, as it does in tuberculous hip, but the symptoms soon subside, while in the tuberculous hip the symptoms continue in an aggravated form. There is, as a rule, no shortening, occasionally $\frac{1}{4}$ to $\frac{1}{2}$ in. Very few cases escape without some form of treatment, and that which is generally adopted is immobilization in plaster of Paris. This relieves the little pain complained of, but does not apparently stop the process.

Case.—Girl, aged $5\frac{1}{2}$, coming under observation on January 8, 1914, gave a history of lameness for four weeks, mother knowing of no cause. The child complained of very little pain, the limbs were equal in length, thigh was $\frac{1}{2}$ in. smaller than its fellow, flexion perfect, extension about 180° F., and beyond this range a little resistance, abduction and adduction limited to a small range. This was put down as an infectious arthritis until X-ray pictures were taken eight or nine months apart. The first one showed nothing suggestive, while the one taken at a later period showed flattening of the head in the upper and outer quadrant. A plaster of Paris spica was employed and renewed from time to time, the little patient getting about very actively, quite free from pain all the while. What purported to be a final note on March 31, 1915, was that the range of motion was about perfect, and the plaster of Paris was discontinued. At this time she was again referred to her dentist, who found a gumboil about one or two of the deciduous teeth. This was incised and she had no further trouble. An end result, however, was recorded in August, 1915, that the hip functions were perfect, little patient entirely free from lameness, and was discharged cured.

Case.—A girl, aged 7, seen February 29, 1916. She was perfectly well until the end of the summer of 1915, and in October of that year she began to limp a little, upon getting up in the morning would cry, and complained as long as she moved about, but there were never any night cries. An X-ray picture was taken in November and another four months later. The difference between the two was that the femoral neck was not so long in the latter, and the head was a little more flattened. There was no deformity, the limbs were equal in length and equal in size; the hip could be flexed to an acute angle and fully extended, but there was a little resistance to abduction and adduction. Treatment was not suggested and a good prognosis given.

In a woman referred for diagnosis, her X-ray plates showed a typical picture of the late stages of the disease. She had recently sustained a strain before coming under observation, but during her 4th or 5th year of age she suffered from a disease about the hip, the history of which was almost identical with those reported.

Case.—A man, aged 61, reported that when 14 years of age or earlier he had what was called hip disease of the left hip, the symptoms and signs coming on gradually with lameness and slight pain. The hip was put up in plaster of Paris, probably a long spica, and at end of year he was quite well. In his statement he was positive that he had continued well and free from deformity and lameness until his fifty-sixth year of age, when he began to favour this hip again without any trauma as an exciting cause. The X-rays showed an osteoarthritis with shortening of the neck and flattening of the head with osseous deposits around the margin of the acetabulum, typical of an osteoarthritis grafted upon an old Perthes' disease. There is nothing to prevent a process such as described developing in a case of this kind, but the coincidence is remarkable. The patient, after failing to get much relief by immobilization in plaster of Paris spica got discouraged and sought advice elsewhere. He wrote under date December 30, 1916, as follows:—

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[1] Abstracted from the *Med. Record*, May 12, 1917.

"Dr. Calot in France tells me that if I could stay at his institution at Berck-sur-Mer for some time he could cure me. I have decided to go some time in January."

Inasmuch as I propose to present some illustrations of Perthes' disease from the X-ray laboratory, it occurred to me that plates of tuberculous hip, of infectious hip, and of probably a luetic hip might give one a better idea of what to look for in studying Rontgenograms.

A case of infectious hip:—

Dorothy O., aged 10, admitted January 10, 1917, with this history: In June, 1915, an abscess formed near the left hip. This was incised in a hospital, and she remained under observation two weeks. At her home traction in bed was employed for about nineteen weeks, following, or, in spite of this, deformity arose, and was corrected under an anæsthetic in a hospital in Milwaukee. A plaster of Paris spica was at once applied, renewed later, and the deformity gave no further annoyance. Since coming to New York, however, there has been a relapse; pains in and about the hip, resulting in her appearance at the hospital. Examination revealed a very easy gait but a marked limp. She was reported as resting well at night; she is able to sit down easily and get her feet out of way, there is no real shortening, 1 in. practical shortening, about 1 in. atrophy of the thigh and none of the calf. There is no abduction or adduction deformity, but the hip is ankylosed at an angle of 150°. There is an old cicatrix on the outer side of the hip, showing the site of the old abscess. The X-ray shows an involvement of the head of the femur, upper rim of acetabulum, and a shortened and broadened neck, as well as destruction of cartilage; the head itself is cup-shaped and fits into the upper rim of the acetabulum.

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Anthrax treated with Normal Serum (J. Penn, *Prensa Medica Argentina*, March 10).—The injection of normal beef serum is given intramuscularly or subcutaneously up to 30 c.c. daily. Of the fifty patients so treated all recovered.

* * *

Oxyuris vermicularis in Denmark (S. Müller, *Hospitalstidende*, March 28).—At least 61 per cent. of the inhabitants of Copenhagen harbour the oxyuris. Trichocephalus was found in 71·4 of patients from rural districts, and only in 36·8 of town patients.

Report.

FURTHER EXPERIENCES WITH EMETINE BISMUTH IODIDE IN AMŒBIC DYSENTERY, AMŒBIC HEPATITIS, AND GENERAL AMŒBIASIS.[1]

By George C. Low, M.A.St. And., M.D.Edin.

Assistant Physician and Lecturer, London School of Tropical Medicine.

In the *Lancet* of August 19, 1916, Dobell and myself briefly described three cases of infection by *Entamœba histolytica* treated by emetine bismuth iodide. Two of these have since been followed up accurately, one W. (No. 3) by Dobell, the other C. (No. 2) by myself. Neither of these has ever shown *E. histolytica* cysts again, and C. has had no further clinical signs of dysentery. Dietetic errors and cold and damp have, it is true, produced a certain amount of abdominal discomfort and slight pain, but, after extensive ulceration of the bowel, one could not expect otherwise. With these symptoms no blood or mucus appeared in the stools, and, as stated above, no parasites were found. Coincident with the disappearance of the dysenteric symptoms the patient improved in general condition and gained weight. Both these cases, I think, may be considered as complete and permanent cures. Tables I and II show at a glance the detailed examinations of the stools.

The value of the double iodide of emetine and bismuth, by the mouth, in the treatment of histolytica carriers is now fully recognized; it remained to be seen, however, whether the drug would be equally efficacious in cases where liver involvement had also taken place. In the following series of cases to be described three cases of amœbic hepatitis figure and, as will be seen later, very good results have also been obtained. In addition, an example of the somewhat rare condition "general amœbiasis" is included. By this term is meant a febrile state without dysenteric and manifest liver symptoms, yet responding quickly to treatment by emetine. *E. histolytica* cysts may be found only with great difficulty, but if sufficient numbers of fæcal examinations are made they should eventually be demonstrable.

Method of Administration.—To begin with, keratin-coated tabloids and stearettes were tried and appeared to act satisfactorily. In one instance, however, suspecting that the drug was not being absorbed, the stools were carefully examined, and three stearettes were recovered quite unchanged. The uncertainty of such an occurrence taking place in other cases decided one therefore to employ the drug in all the other patients as the loose powder in an ordinary gelatine capsule, similarly to the first cases treated by Dobell and myself. The dosage in all the series has been 3 gr. nightly for twelve consecutive nights, as originally recommended by Dale.

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[1] Reprinted from the *Lancet*, March 31, 1917.

A certain amount of sickness occurred in some of these, but this was never of sufficient importance to interfere with the continuation of the treatment, and the same may be said of the diarrhœa which is sometimes met with. To prevent sickness the precautions that were of use in the ipecacuanha days may be employed, the drug, however, in this instance being given on a full and not on an empty stomach. During the course the patient is better kept strictly in bed, the diet being arranged in accordance with the acuteness or chronicity of the symptoms. For most cases a light diet consisting of milk, white meat, and white fish will be found most suitable. At 10 p.m. a small meal should be given, arrowroot, sago, tapioca, or cornflour with a little milk, for example, and then immediately after this the capsule is taken. Five to ten minutes later some boiling water should be sipped, and this should be repeated if any sign of nausea or sickness occur throughout the night. For the first few nights, until one sees how the patient is to tolerate the drug, the pillows should be removed so as to keep the head low, no movement should be allowed, and if saliva accumulates in the mouth it must on no account be swallowed, but should be expectorated or removed by cotton swabs. If after all these precautions the patient is still sick a mustard leaf may be applied to the epigastrium on subsequent evenings, or 10 to 20 minims of tinct. opii may be given half an hour before the administration of the emetine. Such precautions will greatly mitigate, if not entirely prevent, sickness.

The occurrence of this symptom is a very variable one; sometimes the first doses produce it and then a tolerance is established, while in other cases it appears towards the end of the course or irregularly throughout it. Three to four hours after taking the capsule is the usual time for the sickness to appear; there may be one emesis and then no more, or this may be followed up by others with some nausea and discomfort on the following day. In private practice and in ordinary civil hospital practice, when the drug is given in a proper manner and with the ordinary precautions the symptom is of little importance, and may be entirely disregarded in the majority of the cases. In the old days such patients used to take their ipecacuanha without any trouble, the symptoms produced being much more unpleasant than those met with in the above drug.

As regards diarrhœa, a certain amount of this is beneficial rather than otherwise; if excessive it may easily be checked by the administration of opium.[1]

TABLE I.—*W.* (*No.* 3.)

Date:	June, 1916													July										Aug.				Sept.				Oct.			Nov.			Dec.			Jan.,'17		Feb
	9	14	15	16	17	18	19	20	23	24	26	28	30	3	5	7	8	10	13	15	21	24	28	8	14	22	28	5	11	19	26	7	9	28	6	16	29	8	22	29	13	24	8
—		E	E	E	E	E																																					
E h.c.	+	++	+	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE II.—*C.* (*No.* 2.)

	1915	1916																																								
Date:	Dec.	Jan.	Feb.	July																*Aug.						Sept.					Oct.			Nov.					Dec.		Jan.,'17	
	20	13	23	4	11	14	19	20	21	22	23	24	25	26	27	28	29	30	31	10	14	23	25	28	30	1	6	9	13	20	3	11	18	1	8	15	22	29	6	13	10	17
—							E	E	E	E	E	E	E	E	E	E	E	E																								
E.h.	—	—	—	—	++	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E.h.c.	—	—	—	+	—	+++	+++	+++	++	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

* I am indebted to Mr. Redman King for the results of the examinations made during August and September while the patient was staying at Barton.

E = Treatment with emetine bismuth iodide, gr. 3. + = Positive result, small infection. ++ = Moderate infection. +++ = Heavy infection. — = Negative result. E. h. = *Entamœba histolytica*, amœboid stage. E. h. c. = *Entamœba histolytica* cysts.

NOTES OF CASES.

General Amœbiasis.

History.—Patient (McC.) went to Africa April, 1916. He soon had some slight attacks of malaria, but otherwise kept well. In October of same year he began to feel run down and got tired very easily. He then went and consulted Dr. Gray at Lagos, who, on examining his stools, found *E. histolytica* cysts present. Seven injections of emetine, gr. 1, were given and the patient returned to work. General weakness and the tired feeling soon appeared again, so it was decided to send the patient home.

Examination.—Temperature varying from to 101-102° F. at nights. Looks seedy and has lost weight. Teeth black, but sound. Small glands palpable in posterior triangles of neck. Lungs *nil.* Heart sounds a little weak; pulse 100, feeble. Liver, perhaps a little enlarged upwards, level of fifth and sixth ribs and costal margin. Spleen not palpable. No pain on shaking liver nor on deep pressure and percussion. No pain or tenderness over colon. Blood examination: R., 4,600,000; W., 13,000; Hb., 90 per cent. Differential count per cent. was: Polymorphs, 70·5; large mononuclears, 10; lymphocytes, 17·5; eosinophiles, 0·5; transitional, 1; mast cells, 0·5. Number counted, 200. No malarial parasites or trypanosomes. Urine: No albumin, blood, or sugar. Fæces: Heavy infection with *E. coli* cysts, one amœba ? species. Two doubtful cysts that might have been histolytica. Wassermann reaction negative on two occasions.

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[1] Dr. H. H. Dale, who has read this paper in manuscript, tells me that recent experience seems to indicate that the trouble of nausea and vomiting may be eliminated, or reduced to trivial proportions, by giving the double iodide in pills coated with salol. Of a number of formulæ which have been tried the most successful was a pill with simple syrup as excipient and salol coating. Such pills usually pass through the stomach without causing trouble, and appear to break up satisfactorily in the intestine, so that the curative effects are good.

As regards a past dysenteric history, the patient stated that he had never had clinical signs of dysentery nor, as a matter of fact, even any diarrhœa. He was very emphatic about this. Further, he never had had any liver pain or tenderness, his only clinical signs being weakness, some loss of weight, and irregular temperature.

Treatment.—As his temperature was high and I did not like his appearance, and as Dr. Gray had found definite histolytica cysts in his fæces in Africa, I did not wait, but started a course of emetine bismuth iodide at once. This was begun on the night of January 11, 1917, and its effect upon the temperature was at once apparent, this quickly dropping to normal. As marked as this was the effect of the drug on the patient's general condition, he stating that he felt very much better and, further, his leucocytes, which were raised when he came into hospital, also became normal.

Further History.—The improvement has continued up to the date of writing this paper, the patient has had no further fever, he has steadily gained in weight, histolytica cysts have not reappeared in the fæces, and to all intents and purposes he is cured.

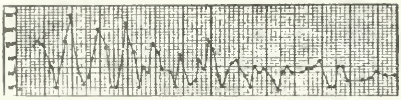

Chart showing the temperature of patient (McC.).

Table III shows his fæcal and blood examinations and the chart his temperature. A study of the former shows that the coli cysts, though disappearing at first, returned and became as numerous as before, a point specially noted by Dobell in several of his series of examinations.

Amœbic Hepatitis Cases.

(1) *History.*—Patient born in England, went abroad to India in 1900. Served there since with usual leaves home. Came home to England April, 1916. Previous illnesses: Attack of dysentery three years ago, very bad one. Since that date had had relapses off and on. Last attack a month ago. A little blood and mucus. Twelve stools a day one day during this period. Treated in India. ? ipecacuanha, never emetine. Frontier sores two years ago, malaria several attacks, never venereal. Present condition: Lately has been very weak, and this has gradually been getting worse. Has lost weight—about a stone; sweats at nights.

Examination.—Looks ill. Teeth very bad. Stripped, very thin. Apices shrunken, poor chest, somewhat pigeon-shaped. No definite signs of tubercle; no dullness at right base. Heart sounds faint; no murmurs. Liver level of sixth and seventh ribs and a little below costal margin; slightly tender at one place and uncomfortable on shaking. Spleen level of ninth-eleventh ribs. Urine: No albumin, blood, or sugar. Fæces: No amœbæ or cysts first examination. A further examination three days later showed scanty histolytica cysts. Blood examination: R., 4,900,000; W., 14,000; Hb., 95 per cent. Differential count: Polymorphs, 74; large mononuclears, 4; lymphocytes, 20; eosinophiles, 1; transitional, 1 = 100.

Diagnosis.—Amœbic hepatitis. ? abscess commencing.

Treatment.—Usual course of emetine bismuth iodide, 3 gr. nightly for twelve consecutive nights. Stearettes were used to begin with, but later were crushed up into powder, as about this same time I had another case in which these were passing unchanged. The patient quickly lost his liver pain. He expressed himself as feeling very much better, his leucocytes fell to normal, and he began to pick up weight. No cysts have been found in his stools since taking his course. Though still a little nervous and excitable, symptoms not associated with dysentery specially, he is now well and has had no further signs of liver pain. Table IV shows the results of his treatment at a glance.

(2) *History.*—Patient had lived in India for twelve years. Previous illnesses: Enteric in 1906. Slight attacks of colitis on several occasions, never off duty for these. One attack of malaria only. Pleurisy four years ago, left side. Present illness: While at home in England two and a half years ago

TABLE III.—*General Amœbiasis.*

Date: Jan., 1917	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Feb. 1	2	3	4	5	6	7	8	9
	E	E	E	E	E	E	E	E	E	E	E	E																		
E.h.c.	?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E.c.c.	+ + +	+	+		+	—	—	+	—	—	—	—	—	—	—	+	—	—	+ + +	+ +	+ +	+ + +	+	+	—	+	+ +	+ +	+	+

Leucocytes.—Jan. 11th: 13,000; 12th: 13,000; 13th: 13,000; 15th: 12,500; 16th: 12,200; 17th: 11,800; 18th: 11,200; 19th: 9,000; 20th: 8,900; 21st: 8,000; 22nd: 7,000.

Temperature raised at beginning, came quickly to normal after the emetine begun. See chart. E. c. c. = *Entamœba coli* cysts. Other signs as before.

TABLE IV.—*Amœbic Hepatitis* (No. 1).

Date:	Dec., 1916															1917 : Jan.	Feb.
	4	7	8	9	10	11	12	13	14	15	16	17	18	20	21	12	6
—		E	E	E	E	E	E	E	E	E	E	E	E				
E.h.	—	—				—	—	—	—	—			—	—	—	—	—
E.h.c.	—	+				—	—	—	—	—			—	—	—	—	—

Leucocytes.—Dec. 4th: 14,200. 7th: 16,800. 8th: 14,000. 9th: 14,000. 11th: 10,000. 12th: 9,800. 13th: 7,400. 14th: 7000. 18th: 6,800.

No mark means stool not examined on that day. Other signs as before. This patient started his treatment with stearettes, after the 13th these were crushed up and given in powder form.

got an attack of liver. Returned to India at the outbreak of war, and went to Mesopotamia in November, 1914. Kept well for the first six months. After that began to get diarrhœa, liver became enlarged and tender. Had rises of temperature also. *E. histolytica* found in stools. Given emetine, seven doses of ¼ gr. each. Improvement on voyage home, but on arrival not feeling fit and liver still tender. Dr. Stevenson examined his stools and found active amœbæ and cysts (*E. histolytica*).

Examination.—Slightly cachectic-looking, cheeks sunken, conjunctiva a fair colour. Lungs and heart nothing of importance. Liver enlarged, edge felt below costal margin, left lobe tender and felt hard. Spleen level of ninth-eleventh ribs. Urine: No albumin, blood, or sugar. Fæces: Free amœbæ and cysts. *E. histolytica* (Stevenson).

Diagnosis.—Amœbic dysentery and amœbic hepatitis.

Treatment.—Emetine bismuth iodide, 3 gr. nightly for twelve consecutive nights. (First part of course stearettes, latter part same crushed into powder.)

Progress.—The amœbæ and cysts quickly disappeared from the stools and have not reappeared. The liver tenderness still persisted, however, a month and a half after the treatment. It is probable that this is due to adhesions having formed between the liver and diaphragm, or between the liver and adjacent viscera. The patient has improved in health and gained in weight, but is not yet normal.

Table V gives the details of his fæcal and blood examinations.

to eight stools a day. No blood, mucus only; severe tenesmus. Given emetine four injections of 1 gr.; this stopped the dysentery at once, all symptoms disappearing. After this jaundice and abdominal pains. While in hospital at Bombay Widal negative to all typhoid group and nothing grown from stools; rigors and pain over gall-bladder, also bad pyorrhœa. Lately tendency to constipation and pain over gall-bladder still.

Examination.—Heart and lungs *nil*. Tender over liver on deep percussion, and also tender on pressure over lower border of liver in gall-bladder area. Liver enlarged both upwards and downwards. No tenderness over colon. Spleen not palpable. Blood examination: R., 5,000,000; W., 6,000; Hb., 100 per cent. Differential count per cent.: Polymorphs, 63; mononuclears, 11; lymphocytes, 22; eosinophiles, 2; transitional, 1; mast cells, 1. Films: No malarial parasites. Urine: No albumin, blood, or sugar. Fæces: *E. histolytica* free, minuta stage. *E. histolytica* cysts. *E. coli* cysts. No ova.

Diagnosis.—Amœbic dysentery carrier, amœbic hepatitis.

Treatment.—Painted tender area with lin. iodi. Course of emetine bismuth iodide, gr. 3, in powder in gelatine capsules for twelve consecutive nights.

Progress.—The patient took his first three doses without trouble, but was sick after the fourth. After this there was no further sickness, but a diarrhœa started, which, however, was easily controlled by tinct. opii. About the middle of the course the pain over the liver diminished and he felt better. On January 23rd, the day after the course was finished, he passed some mucus in his stool and felt his liver a little, while there was also a slight rise of temperature the same evening. The blood showed leucocytes 10,600 with no sign of malaria. Two days after the pain over liver disappeared, and up to the present has remained quiescent. Convalescence, though somewhat slow, has been sure, and there is reasonable hope of a permanent cure. Table VI shows the results of his treatment at a glance.

TABLE V.—*Amœbic Hepatitis* (No. 2).

Date:	Dec., 1916														Jan., 1917															Feb.											
	13	14	15	16	17	18	19	20	21	22·	23	24	25	29	4	8	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12
—		E	E	E	E	E	E	E	E	E	E	E	E																												
E.h.	+ +	+					—							—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E.h.c.	+	+					—							—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Leucocytes.—Jan. 19th: 6,000; 20th: 7,000; 22nd: 7,200; 23rd: 9,400; 24th: 5,800; 25th: 6,000.

(3) *History.*—Patient (McG.), born in Scotland, went to Burma in 1912; in Rangoon in civil employment. Joined Army in 1914; France early in 1915; left there in December, 1915, and went to Mesopotamia, arriving in January, 1916. Invalided for jaundice and dysentery to Bombay; there two months, then sent home. Previous illnesses: Fever at times in Burma, no dysentery there, no venereal. Present illness: Dysentery in Mesopotamia. Seven

TABLE VI.—*Amœbic Hepatitis* (*No.* 3).

Date:	Jan. 1917																					Feb.											
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12
—	E	E	E	E	E	E	E	E	E	E	E	E																					
E.h.	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E.h.c.	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
E.c.	—	—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E.c.c.	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	+	+	—	+	—	—	+	—	+	—	+	—	+	—	+	+

E. c. = *Entamœba coli*, amœboid stage.

Convalescent Carrier Cases.

(1) *History.*—Patient (Ch.) joined the Army in 1914. Went to India in October, 1914. Stayed there till March, 1915, when invalided home for heat-stroke. Before leaving also contracted dysentery. Treated for this on way home by emetine injections, four in all. Finally invalided out of Army for epileptic fits. Present illness: After leaving Netley was treated at home by rest in bed and milk diet. Got much better after this. Afterwards went to Bournemouth, began ordinary diet, this being followed by diarrhœa and severe bleeding. Then another relapse of his dysentery. Treated by ipecacuanha, ? dose, and by more emetine injections. During 1916 bowels still very loose, and anything easily upset him. Lately has had constipation alternating with diarrhœa; pain in the abdomen as well.

Examination.—Heart sounds, nothing to note. Says he gets out of breath very easily if he takes any exertion. Lungs, no signs of tubercle. Some pain over colon on deep pressure. Urine: no albumin, blood or sugar. Fæces: *E. histolytica* cysts heavy infection, *E. coli* cysts; no flagellates, no ova.

Diagnosis.—Amœbic dysentery, cyst carrier.

Treatment.—Emetine bismuth iodide, gr. 3, powder in gelatine capsules, nightly for twelve consecutive nights.

Progress.—Improved after course very much, all diarrhœa and pain disappearing. Patient also felt stronger, and stated that he had never felt so well since acquiring his dysentery. Cysts disappeared rapidly from his stools after commencing treatment and have not reappeared (Table VII). On January 18, 1917, an intensive daily examination of the fæces was begun, this lasting for over three weeks. Cysts have been absent during the whole of this period, and a permanent cure may be confidently anticipated. All symptoms have disappeared, and the stools now are normal in number and consistence.

(2) *History.*—Patient (Q), born in Newfoundland, joined Navy in 1910; been in it since. After war in Mediterranean chiefly. Present illness: At Tunis, September 16, 1916, seized with dysenteric symptoms, mucus, blood, and tenesmus, but not much straining. Went into hospital. Emetine, fifteen injections in all, ? dose. Much better after these. Stools now one or two a day, normal. Pain in abdomen occasionally.

Examination.—Some bad teeth. Heart and lungs nothing to note. Liver level of sixth and seventh ribs and costal margin; spleen level of ninth-eleventh ribs; no pain in abdomen. Urine: No albumin, blood, or sugar. Fæces. *E. histolytica* cysts, moderate infection; *E. coli* cysts, heavy infection.

Diagnosis.—Old dysentery, amœbic carrier.

Treatment.—Emetine bismuth iodide, gr. 3. powder in gelatine capsules, for twelve consecutive nights.

Progress.—Histolytica cysts quickly disappeared (Table VIII) from the stools and have not returned. The patient is well, and now shows no signs of any abnormality in his bowels.

Relapsing Amœbic Dysentery Twenty-six Years after Original Infection.

History.—Patient (McL.) had acute dysentery in Egypt in 1890. Ten years later in England a relapse, treated by ipecacuanha, promptly recovered. Since that date until December, 1916, no intestinal disorders of any sort. Present illness: Started with an attack resembling influenza. Pain all over and

TABLE VII.—*Convalescent Carrier Case* (*No.* 1).

Date:	Nov., 1916													Dec. Jan., 1917																			Feb.											
	14	15	17	18	19	20	21	22	23	24	25	26	27	5	13	3	10	16	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	12	13
—		E	E	E	E	E	E	E	E	E	E	E	E																															
E. h. c.	+++					—								—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E. c. c.	+					—									—	—	—	—	—	—	—	—	—	—	—		—	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE VIII.—*Convalescent Carrier Case* (*No.* 2).

Date:	Jan., 1917																															Feb.											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12
—	E	E	E	E	E	E	E	E	E	E	E	E																															
E.h.c.	++	++	+	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—								
E.c.c..	+++	++	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+	+	+	+	+	—	—	+	+	+	+	—	+	++	+	+	+	+	+	+	+	+

aching bones. Then suddenly seized with all the symptoms of acute dysentery; blood, much mucus, great straining, abdominal discomfort, and passage of numerous stools. Fæces: Stools typically dysenteric, much blood and mucus. Amœbæ present, *E. histolytica*, minuta stage, and coli cysts.

Treatment.—Stearettes of emetine bismuth iodide, 3 gr. in each, were immediately begun. The symptoms at once responded to these, the amœbæ disappeared from the stools, also the blood and mucus, and the patient quickly recovered. As constipation set in during the middle of the course, one suspected the possibility of the stearettes not dissolving, and an examination of the stool proved that this was so, three stearettes being recovered quite unchanged. (This is the case referred to at the beginning of the paper.) That the first stearettes did dissolve, however, is fairly certain, as there was considerable nausea after taking them and the symptoms cleared up so quickly. Since then there has been no clinical relapse. Stool examinations were only possible on three occasions after the end of the treatment. The case is reported to demonstrate the extraordinary chronicity of an amœbic infection.[1] Table IX shows the treatment and fæcal examinations at a glance.

A brief study of this series of cases shows that emetine given by the mouth, as emetine bismuth iodide, is apparently as efficient as emetine by the needle in cases of amœbiasis with liver involvement. Ipecacuanha used to act also, it is true, but one of its disadvantages was the sickness so often produced, this being badly borne by patients suffering from severe liver pain. These facts must mean that sufficient emetine is absorbed into the general circulation to act on the parasites in the liver, it being conceded, of course, that parasites are actually there when hepatitis, enlargement of the liver, and leucocytes are present, the precursors of a definite abscess formation. The advantage of oral administration over hypodermic in such cases would seem to consist of the more potent sterilizing powers ultimately shown by the double iodide on the amœbæ in the bowel, thus removing a possible source of subsequent reinfection of the liver.

Dobell has shown in cases treated by emetine hydrochloride subcutaneously 70 per cent. relapse, whereas when emetine bismuth iodide is employed by the mouth this figure is reduced to about 10 per cent.; or stating this as regards cures, only 30 per cent. are got by the former, 90 per cent. or more by the latter. If, then, the latter can get rid of the acute symptoms satisfactorily and at the same time quickly, it is the best drug to use, as it is much more likely to sterilize the patient completely of his parasites in the bowel lesions at the same time. In cases of great urgency it might be advisable to give some injections first and then to follow these up by the oral method.

A point one may mention here, especially so as many people appear to entirely misunderstand it, is that the emetine does not kill the cystic stage of the parasite: it kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off, and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.

As far as one can judge, then, at present, emetine bismuth iodide holds out good hope of permanent cures in the different varieties of amœbiasis, in the sense that the patient is entirely sterilized of his amœbæ. The subsequent course of the disease will depend upon the extent of the original lesions—namely, the amount of bowel denuded of epithelium, deep ulceration producing peritoneal adhesions, strictures of the bowel, adhesions between liver and diaphragm, or between liver and adjacent viscera, and so on. Attacks of pain, bouts of diarrhœa, and definite colitis are not infrequent even after all signs of amœbæ have disappeared. The patient, it must not be forgotten, must be strictly dieted for a long period after his course of emetine; he must avoid wet and damp, and should abstain entirely from alcohol.

Some clinicians still prefer ipecacuanha in these chronic relapsing cases. In the old days the drug acted very well clinically, but in the light of modern research careful and prolonged fæcal examinations would have to be made in order to determine the real value of such cures. If the emetine is the real essential in the ipecacuanha, then a much larger dose can be given in a more convenient form by the use of the double iodide.

Finally, as regards dosage if those who try the drug would attend carefully to the rules laid down for its administration there would be fewer disappointments. Some working standard must be adopted, and experience shows that that recommended by Dale of 3-gr. doses every night for twelve consecutive nights (*36 gr. in all*) is a good one. Dobell suggests that some cases may require an increased quantity, and in such the period may be extended even to twenty instead of twelve nights. Not less than *36 gr. in all* should be given, as smaller

TABLE IX.—*Relapsing Dysentery Twenty-six years after Original Infection.*

Date: Dec., 1916	6	7	8	9	10	11	12	13	14	15	16	17	18	22	28
—	E	E	E	E	E	E	O	O	E	O	E	E			
E. h.	+	+	—			—		—		—			—	—	—
E. h. c.	—	—	—			—		—		—			—	—	—

Date: Dec., 1916	6	7	8	9	10	11	12	13	14	15	16	17	18	22	28
—	E	E	E	E	E	E	O	O	E	O	E	E			
E. c.	?	—	—			—		—		—			—	—	—
E. c. c.	+	—	—			—		—		—			—	+	+

Stearettes passed unchanged on Dec. 12, 13, and 15.

See also *Brit. Med. Journ.*, Dec. 23, 1916, for details of another example.

quantities are generally followed by relapse. The case mentioned at the beginning of the paper (W., No. 3) is the only one, according to Dobell, that has been cured by so small a total as 15 gr. in all—viz., 3 gr. on five consecutive nights.

I have again laid stress on this dosage, as this has been misquoted and incorrectly stated, at least three times, in different journals.[1] It is to be hoped that those incorrect statements have not led people into errors in prescribing the drug.

Notes and News.

CHINESE BLACKWOOD.

Will the mystery that hangs around Chinese blackwood never be solved? We seem to be ignorant (but perhaps the botanists are not) of the source of this material, or if it has several sources, as it seems to have, curiosity alone impels one to ask to be told authoritatively of even one of these.

Here is an article which appeared in the *London and China Telegraph* which gives some little, but a very little, light on the subject:—

For the manufacture of the so-called "blackwood" furniture the Chinese employ several distinct species of timber, the botanical identity of which has hitherto been a matter of some uncertainty. The blackwood is imported into China chiefly from Bangkok and Saigon, but some forms are also imported from Java. It is not possible to state definitely the amount of blackwood annually imported into China, as this is not separately recorded in the Chinese Maritime Customs Returns of Trade, but the imports of hardwood (exclusive of sandalwood) into China during the years 1913-15 indicate the importance of the trade in hardwoods. Some information relating to the blackwood exported from Siam to China has been obtained from a memorandum on the subject recently received at the Imperial Institute from H.B.M. Consul at Bangkok. Blackwood occurs in India and the Malay Peninsula, and it would, therefore, appear worth while for Indian and Malayan exporters of timber to give some attention to the Chinese market.

In Siam the rosewoods are worked more particularly from the regions lying north-east and east of Bangkok. They are exported in the form of roughly trimmed round logs, of average size from 1 ft. to 2 ft. in circumference, and from 6 ft. 8 in. to 10 ft. in length. The timber could probably be obtained in slightly larger logs, but, owing to its great weight, the size mentioned appears to be the largest that the Siamese villagers can conveniently handle and transport. Further, as this timber is employed by the Chinese almost entirely for furniture-making, a demand for larger pieces does not appear to have arisen. The Siamese rosewood forests have been heavily overworked in the past. The species of *Diospyros* that yield the ebony woods are found to the westward of Bangkok, in the districts of Kanburi, Petchaburi, and southwards towards the Malay Peninsula.

The extraction of these woods is not a regular industry anywhere in Siam, but forms one of the desultory occupations of the people when they are not engaged in rice cultivation. The wood is bought from the natives by the Chinese, who are either middlemen or the agents of Chinese firms in Bangkok. The blackwoods are too heavy to float, and are therefore brought down to Bangkok either by boat or rail. They are sold by weight, the unit for export being usually 100 piculs, and the average prices £22 10s. to £37 10s. per unit for rosewoods and about £22 10s. for ebonies. The price for rosewoods varies according to the size of the log, the age of the trees, and the fineness of the grain. The furniture made for the Chinese home market is not so elaborately carved as that intended for export to Europe, but great importance is attached to the finish and polish of the wood and also to its colour and uniformity of grain. In the furniture made for the European market the wood is stained black and waxed so that the original colour is completely hidden. Examples of Chinese blackwood furniture are exhibited in the Hong-Kong Court of the Public Exhibition Galleries at the Imperial Institute.

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Personal Notes.

Colonial Medical Services.

West African Medical Staff.

Transfers and Promotions.—C. E. S. Watson, M.R.C.S.Eng., L.R.C.P.Lond., Senior Medical Officer, to be Provincial Medical Officer, Nigeria (Northern Provinces); J. C. M. Bailey, M.D.Lond., M.R.C.S.Eng., L.R.C.P.Lond., Temporary Lieutenant, R.A.M.C., Medical Officer, to be Senior Medical Officer, Nigeria (Southern Provinces); A. E. Horn, M.D.Lond., M.R.C.S.Eng., L.R.C.P.Lond., B.Sc.Lond., Senior Medical Officer, from the Gambia to Nigeria (Northern Provinces); E. C. Adams, M.R.C.S.Eng., L.R.C.P.Lond., Senior Medical Officer, from the Gold Coast to the Gambia.

Retirement.—R. W. Gray, M.B., C.M.Edin., D.P.H.Cantab, Senior Medical Officer, Nigeria (Southern Provinces), retires on pension.

Resignation.—G. G. P. Beckett, M.D., B.Ch., B.A.O Dublin, Temporary Lieutenant, R.A.M.C., Medical Officer, Gold Coast, resigns his appointment.

G. F. Darker, M.D., D.P.H.Durham, M.R.C.S.Eng., L.R.C.P.Lond., ceases to be temporarily re-employed as Medical Officer, Nigeria, Northern Provinces; H. G. F. Spurrell, M.B., B.Ch.Oxon, F. Z. S., ceases to be temporarily employed.

The following officers, whose services have been placed at the disposal of the Army Council, have been given temporary commissions in the R.A.M.C.: Messrs. A. C. Parsons, C. L. Ievers (Gold Coast), E. A. Charters, W. G. Cobb (Nigeria).

The following officers have been temporarily lent to other administrations: Messrs. A. E. Horn, T. H. Suffern (Nigeria), G. J. Keigwin (Gold Coast) to the Provisional Civil Administration, German East Africa; H. F. Hamilton (Gold Coast), P. A. Clearkin, J. McK. Clark, J. M. O'Connell (Sierra Leone) to the East Africa Protectorate; J. Currie (Nigeria) to the Uganda Protectorate; H. E. Arbuckle (Sierra Leone), E. A. Quirk (Nigeria) to the Nyasaland Protectorate.

The following officers are on military duty in East Africa; Messrs. T. M. R. Leonard, G. H. Gallagher, T. R. Sandeman, E. Gibson, C. Mackey (Nigeria).

In an abstract of the paper by myself and Dobell (*The Lancet*, August 19, 1916) in the *Journal of the American Medical Association* (Sept. 16, 1916, p. 908), again in the *Prescriber* (vol. xi., No. 24, January, 1917, p. 12), and, lastly, in the Journal of Tropical Medicine and Hygiene (Feb. 1, 1917, p. 30) from subsequent papers by Dobell.

Original Communications.

NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.[1]

By Lieutenant Colonel ALDO CASTELLANI, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

THE present paper is based on the work I have done in Serbia, Macedonia, and other parts of the Balcanic and Adriatic zones during the last two years. It is not my intention to go fully into every tropical disease to which the Allied troops are exposed in these zones, but merely to touch on a few points and features of each malady which have especially attracted my attention.

My remarks, based on my own clinical experience, though of little or no scientific importance, may perhaps be useful to medical officers joining the Balcanic forces, as certain clinical points to which I refer are hardly mentioned in text-books, or are given in a way which at times does not correspond with what one actually sees in practice in the Balkans.

I use, of course, the term "tropical diseases" *sensu lato*, or very few maladies indeed would remain in the domain of the tropical specialist. As a matter of fact certain diseases which are often called tropical, as, for instance, "typhus exanthematicus" and "Malta fever" are of more frequent occurrence in temperate zones than in the Tropics.

Before beginning to relate my observations, I feel it my duty to place on record my great indebtedness to the military authorities of the British, Italian, French, Serbian, and Russian Armies; and I wish also to express my thanks to the Serbian Relief Fund and its Committee and to the American Red Cross Commission, to the hospitals of which I have been attached on several occasions.

I beg to express my thanks to Surgeon-General Rho, the Chief of my Service, for permission to publish this paper.

MALARIA.

The number of cases of malaria throughout the Adriatic and Balcanic zones during the years 1915-16 has been appalling, and the cases of pernicious type quite common.

Unfortunately during recent years in certain quarters in Europe, and even in tropical countries, there arose a tendency to consider malaria as being a not very dangerous disease, and that its importance had been somewhat exaggerated; its prevention and cure being, in theory, a very simple matter. The present experience in the Balkans has come, therefore, as a rude awakening, and has shown what a terrible scourge this disease can be. The experience we have had in Serbia, Macedonia, and the Adriatic zone, in addition to showing the frequency and seriousness of this malady, has also shown what a proteiform disease it is. This, of course, is nothing new to the tropical practitioner of long experience, but it is decidedly bewildering to the young medical man just out from home. It is especially on these proteiform features of the malarial infections, as well as on the prognosis and treatment of the malady, that I should like to say a few words.

It may be said at once that in the Balcanic zone the classical malarial fevers, as described in books, are not frequent. The clinically atypical cases are extremely numerous, and the patient may present symptoms pointing to the most widely different pathological conditions; indeed, there are very few internal diseases which malaria may not simulate, and it may even give rise to syndromes closely resembling surgical conditions.

I shall take, to begin with, diseases of the blood.

Diseases of the Blood.—The *hæmorrhagic type of malaria.* Near Skopolje, in Serbia, in September, 1915, an outbreak of so-called scurvy was reported as occurring in a Serbian regiment, and I was asked to investigate the condition. The patients were extremely pale; felt very weak and languid, complained of pains in the loins and limbs; in most cases the whole body was covered with petechiæ and tense indurated swellings, due to large extravasations of blood, were present in several cases. In many of the patients bleeding was taking place from the gums, which were swollen and spongy, and from the nose; in two cases there were hæmorrhages from the stomach and intestine; in one there was hæmorrhage from the lungs and bronchi; in another from the kidneys and bladder. In none of the cases was fever noticed, but the presence of a large indurated spleen in two of the patients, and the fact that I had seen similar cases in the Tropics, made me suspect malaria, and, in fact, the blood examinations made soon after showed presence of malaria parasites, though only in about 10 per cent. of the cases. However, all of them were put on quinine, and all the symptoms improved in a remarkably rapid manner, and disappeared completely within three to six weeks. In some cases I gave calcium lactate in association with quinine, but I soon found out it was unnecessary. The diet was not changed in any way. This type of purpura of malarial origin must be distinguished from the ordinary types of purpura, from scorbutus, also from a peculiar hæmorrhagic affection of spirochætic origin, without jaundice.

The "Pernicious Anæmia" Type of Malaria.—Of this type I have seen several cases both in the Balkans and in tropical countries. The appearance of the patient is quite different from ordinary malarial cachexia, and there may be no history and no sign whatever pointing to a malarial infection. The patient is generally a young man or woman with the typical pallor and the lemon-yellow tint of pernicious anæmia; in some cases the liver is slightly enlarged, or, more rarely, the spleen; there is no fever, or just 90° or 100° at night, which is quite common also in pernicious anæmia. The blood may be negative for malaria on repeated examinations, and may show most of the common features of pernicious anæmia, such as poikilocytosis, nucleated red cells, high colour index, relative increase of the small mononuclears instead of the large mononuclears as one would expect in malaria.

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[1] This paper is an amplification of a lecture given at the Royal Society of Medicine on June 13, 1917.

We had one such case for several months in 1915 at one of the Uskub hospitals. The patient, a Serbian soldier, aged 21, was in appearance fairly well nourished but very pale, with a lemon-yellowish tint; he was always very languid and apathetic, and stayed in bed the whole time; no fever, no enlargement of spleen or liver, blood 2,100,000 r.b.c.; marked poikilocytosis, some nucleated red cells present; leucocytes 5,000; with a large increase of the lymphocytes (55 per cent.). He was considered to be a case of pernicious anæmia, and accordingly was treated with arsenic for several months, when suddenly one day he had a rigor, the temperature going up to 105° F., the spleen became just palpable, and a few subtertian rings were found in the blood. A quinine treatment by intramuscular injection was immediately started, and within two months the patient was so improved that he was discharged and returned to his regiment.

In old individuals the profound anæmia may give rise to the suspicion of internal *cancer*. A man, aged 60, was admitted to the Sorovitch Hospital in a condition of profound anæmia; he was greatly emaciated, with no fever, no enlargement of the spleen or liver, and with dyspeptic symptoms dating from several months; complete loss of appetite, pain after taking food, vomiting, which he said was of a dark colour. The doctor who had attended him very naturally had suspected cancer, especially as the usual treatment for dyspepsia, dieting, &c., had completely failed. Some time after his admission to hospital the examination of the blood one day revealed presence of a few crescents. A quinine treatment caused all the symptoms to disappear within a few weeks.

Diseases of the Nervous System.

The Polyneuritic Type.—This type has been denied by many observers, but I have come across a number of cases, both in the Tropics and in the Balkans. I would call attention to the type of malarial polyneuritis which simulates very closely wet beriberi. The patient is œdematous; there is the characteristic gait; knee-jerks absent. No fever, no enlargement of the spleen or liver. In two such cases the blood showed Laveran's crescents. They both got well on quinine given in large doses by the mouth and by intramuscular injection. One of my patients, suffering from malarial polyneuritis, showed peculiar mental symptoms, with loss of memory for recent events—a condition resembling Korsakov's disease, polyneuritic psychosis. A similar case has been recently ably described by Dr. H. Carlill.

As regards cases of mononeuritis and neuralgia, tic, &c., of malarial origin, these are, as is well known, quite common. I have seen an interesting case of meralgia paræsthetica which had resisted every treatment for months yield to quinine in twenty-four hours.

Malarial syndromes of the central nervous system are quite common. I may mention some of the types I have seen:—

Comatose Type.—This was quite common during the epidemic of malaria in Skopolje and the surrounding districts during August and September, 1915. The patient is brought into hospital comatose; he cannot be roused to answer questions; he will only moan. The respiration may be stertorous, or sometimes quiet. The pupils are often contracted, there may be high fever, or the temperature may be normal or subnormal, and in this case a diagnosis of opium poisoning has occasionally been made. The comatose condition becomes deeper and deeper, and the patient often dies a few hours after admission; occasionally, however, intravenous and intramuscular injections of quinine induce a cure. Very recently a soldier was brought to my wards at the Sorovitch Hospital in a comatose condition, temperature 101° F., spleen palpable. An injection of gr. xv was given at once in both buttocks. After six hours he became conscious.

The comatose type of malaria is of great interest; it may develop quite suddenly in old malarial patients also in temperate zones. A most interesting case has recently been observed in London by Professor Hewlett. The patient, a sailor, suffered from very indefinite symptoms and went to a venereal clinic. His blood was tested for Wassermann, which was found to be positive. He was given an injection of salvarsan. A few days later the same patient was brought in a comatose condition to the Seamen's Hospital, and died within a few hours of admission. At the post-mortem nothing was found pointing to any definite pathological condition, but Dr. Hewlett made an histological examination of the brain, which revealed enormous numbers of malarial parasites in the capillaries.

The Delirious Type.—In this type, of which I have seen several cases in Skopolje, delirium is the most marked feature; it may be followed by coma and death. These cases have been occasionally confused with alcoholic delirium tremens.

The Cerebrospinal Type may simulate cerebrospinal meningitis very closely indeed. A patient was admitted to one of the Skopolje hospitals in September, 1915, with extremely severe headache and vomiting, fever, and retraction of head, Kernig's symptom. Blood: slight leucocytosis; no parasites. A diagnosis of cerebrospinal meningitis was made, the patient isolated, and a lumbar puncture performed. The cerebrospinal fluid escaped with higher pressure than normal, but was completely clear. Blood again examined: malaria. All the symptoms disappeared after a few intramuscular injections of quinine.

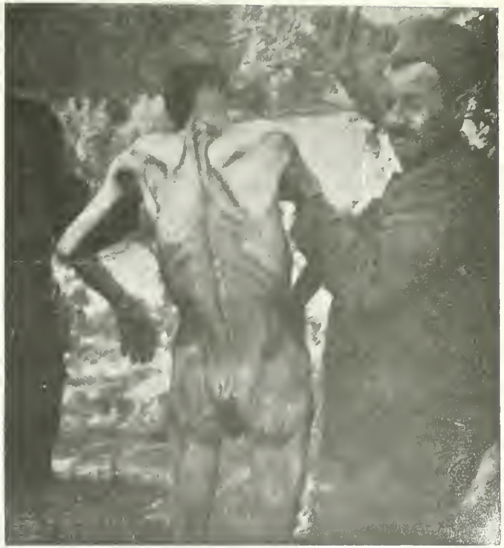
The Hemiplegic and Monoplegic Types are occasionally met with simulating cerebral hæmorrhage.

Some members of the American Red Cross Commission on Inoculation Expedition.

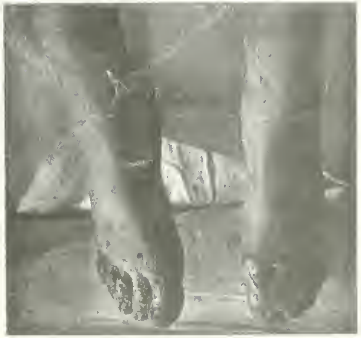
Uskub

The Lady Paget Hospital, Uskub.

To illustrate paper, "Notes on Tropical

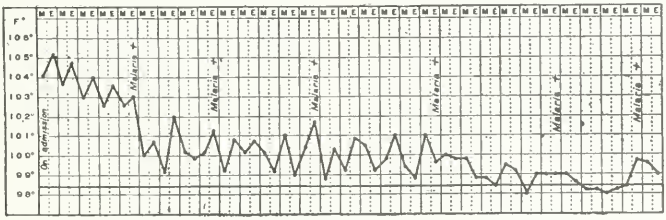


Soldier suffering from "famine diarrhœa," after the Albanian retreat.



Gangrene of malarial origin (Falconer and Anderson).

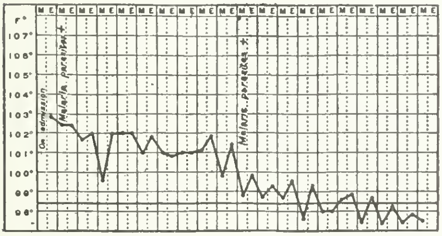
I have seen several such cases. Subacute and chronic, cerebral and cerebellar types are not very rare. At the American Red Cross Clinic in Skopolje I saw a most interesting case of the cerebellar type; a man of about 30 came for treatment showing all the symptoms of a cerebellar tumour; he was ataxic, walking like a drunken man; he complained of severe headache, vomiting, and almost complete loss of vision. His temperature was normal, and he did not give any history of fever. Spleen and liver not enlarged. The blood showed crescents. All the symptoms disappeared after an energetic quinine treatment.



Malaria simulating Typhoid.

Hæmocultures and serological reactions for typhoid, para. A, para. B, and intermediate germs, negative.

In Ceylon I have seen a similar case, also cases with symptoms pointing to tumour of some other part of the cerebrum. Some cases have intermittent fever, generally low, and then an abscess is suspected. I have seen a case of bulbar malaria with difficulty of speech, of deglutition, and facial paralysis.



Malaria simulating Typhoid.

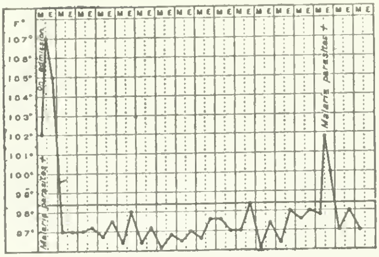
Hæmocultures and serological reactions for typhoid, para. A, para. B, and intermediate germs negative.

The Spinal Types are rare, but I have seen a case of clinically typical *transverse myelitis* due to malaria. I have seen one case in the Balkans, and three in the Tropics, of a malarial condition closely resembling *disseminated sclerosis*, with scanning speech, intentional tremor, nystagmus, spastic gait, and increased reflexes. All the cases were cured by quinine.

The Mental Type.—Malaria may occasionally simulate mental disease. I have come across two cases of apparent mania, and one of apparent melancholia, all cured by quinine. I have already mentioned a case presenting Korsakov's syndrome.

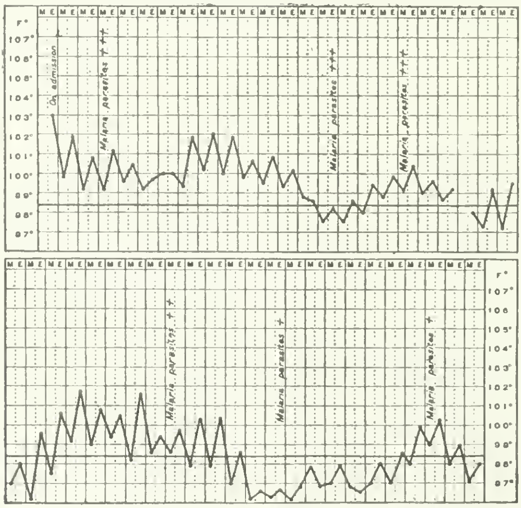
Specific Infectious Diseases.—Malaria may simulate various specific infections. The typhoid-like type of malaria was far from rare in Southern Serbia and Macedonia in 1915, and I have again seen similar cases very recently near Monastir. From Gevgheli, for instance, it was reported in September, 1915, that an epidemic of typhoid had broken out. Dr. Strong, head of the American Sanitary Commission, Dr. Jackson, and later on myself, went there and soon found out that more than 90 per cent. of the so-called cases of typhoid were cases of typhoid-like subtertian. This type, as a matter of fact, was fairly common also in Skopolje, and numerous cases were admitted in September, 1915, to the 6th Reserve Military Hospital, so well organized by Lady Ralph Paget. In this type of malarial fever, as seen in the Balkans (I have seen similar cases in the Tropics), the onset was often slow, the patient looked apathetic and complained of headache, the tongue was very coated, the temperature was continuous or subcontinuous, abdomen slightly tumid, spleen generally palpable, but neither very large nor very hard; the patient had certainly all the appearance of a typhoid case. The blood showed, as a rule, numerous ring forms, and—a most important feature—quinine given in large doses had practically no influence for a long time either on the fever or the parasites. All the bacteriological examinations for typhoid, paratyphoid, and the intermediate germs were, as a rule, negative; very occasionally a case of mixed infection, malaria and typhoid, was found.

Malta Fever Type.—The undulant type of malaria is extremely rare, but it certainly exists. I have seen a case in Skopolje; the fever, of a typical undulant type, continued many weeks, and was not influenced in the least by quinine gr. x. t.i.d., given by the mouth for several weeks. Malarial parasites were found in the blood repeatedly, agglutinins for



Malaria—Hyperpyrexia.

Malta fever, and 2-para melitensis negative. Hæmocultures negative. The fever finally yielded to quinine given intramuscularly.



Malaria simulating Malta Fever.

Hæmocultures and serological reactions for *M. melitensis* and *paramelitensis*, negative.

Yellow Fever and Weil's Disease Types of Malaria.—A Serbian officer in Macedonia suddenly developed fever, 103° F., with severe headache, flushed face, severe pains in the body, no rigors, pulse quick, full and bounding, severe vomiting, with tenderness in the epigastric region; slight albuminuria. On the morning of the third day the temperature dropped to 100° F., the pains disappearing, and the patient felt much better, but on the evening of the same day the temperature rose to 105° F., while the pulse became comparatively slow (64 per minute), jaundice appeared, the spleen became slightly palpable, severe vomiting started again of dark brown colour, containing red blood corpuscles; the jaundice deepened very quickly, all the symptoms became worse, and the patient died on the sixth day, notwithstanding a very energetic quinine treatment. The blood was teeming with subtertian ring forms.

I saw in an island in the Adriatic zone a very similar case, but with severe hæmorrhages in the skin closely resembling *Icterus hæmorrhagicus*, and terminating fatally. Cases of malarial jaundice simulating a simple catarrhal jaundice were also seen occasionally.

Tetanus-like Malaria.—I have seen a typical case in Macedonia in 1915, and three in the Tropics. The patient had a normal temperature, with trismus opisthotonos, and typical tetanic spasms. In all the cases the blood was positive, and an intensive quinine treatment induced a cure.

Hydrophobia-like Malaria.—I was once called by a Ceylonese colleague near Colombo to see a case which had been diagnosed as hydrophobia. The patient had been bitten by a stray dog, about which nothing was known, two months previously; at the time I saw the patient he was in a maniacal condition; temperature 102° F. At the mere sight of water a severe spasm of the larynx occurred. As he had a large spleen I examined his blood with my portable microscope; it was teeming with parasites. Gr. xv of quinine hydr., given by intramuscular injection in each gluteal region, caused all the symptoms of hydrophobia to disappear in a few hours.

It may have been a case of hydrophobia syndrome of a hysterical origin in a malarial patient, though the patient was not of a neurotic disposition and, according to what his relatives said, had never troubled in the least about the bite he had received.

Sleeping Sickness Type.—This type of malaria, so far as I know, has never been described. I have seen a typical case in a tropical country where sleeping sickness is unknown. The patient had low fever for months, with slight trembling of the hand and tongue, and progressive general weakness; then he became drowsy, and occasionally had convulsions. The blood examination was negative for every known parasite until six months from the onset of the symptoms; then a few malarial parasites were found. An energetic treatment by quinine cured the patient. A somewhat similar case, though not so severe, with general debility, trembling of hands and tongue, very marked drowsiness for weeks, was seen by Dr. Mitchell and myself at Skopolje, but the correct diagnosis in this case was made at once, as the blood was full of malarial parasites. The patient very slowly recovered after an intense quinine treatment.

Diseases of the Digestive System simulated by Malaria.

I have already called attention to those cases of severe anæmia in old people with dyspeptic symptoms which may suggest carcinoma ventriculi. I might here mention a case with symptoms pointing to gastric ulcer which I saw in a young girl in Ceylon. She had gastralgia, with pain shooting often backwards, severe vōmiting, hyperchloridia, anæmia. Cases of so-called simple dyspepsia or gastric catarrh have not rarely been observed by me, due to a latent malaria infection.

Malarial Acute Enteritis: Pseudo-dysentery.—Of this form two types in my experience may be distinguished: one with typical dysenteric stools containing blood and muco-pus, the other with purely hæmorrhagic stools without pus, and with very little or no mucus. I shall always remember a case of the first type which I once saw in consultation in a tropical country. The patient had been treated with ipecac., anti-dysentery serum, bismuth, salol, nitrate of silver irrigation, &c., for months. The condition very rapidly and completely yielded to quinine within forty-eight hours. In this case the temperature was practically normal; on examining the patient I was just able to feel the spleen, and this put me on the right track. On questioning the patient, the fact was elicited that he had had attacks of malarial fever six years previously.

One must not forget, of course, that there are quite a number of cases of mixed infection: malaria—bacterial or amœbic dysentery, but the case I have described was certainly not one of these, the examination of the stools which I made being negative for entamœbæ of the Shiga-Kruse and Flexner groups. I have seen very similar cases also in the Balkans.

Pseudo-cholera.—During the epidemic of cholera in Ceylon in 1914, I was called to confirm the diagnosis of cholera in a European assistant of one of the big tea firms of Colombo, so that he could be removed to the Infectious Diseases Hospital, which proceeding the patient strongly objected to, and was resisting with what little strength he had left. He had been taken ill suddenly in the night with profuse serous diarrhœa. When I was called to see him at 11 a.m. he was feeling very cold, his skin clammy, his cheeks sunken, and he looked very ill indeed. Temperature 99° F., pulse 104. The stools were absolutely cholera-like, with the well-known rice water appearance. On examining the patient I found the spleen just palpable, but very hard. On questioning him I found that he had had an attack of malarial fever three weeks previously on an estate where he had gone for a short holiday. The blood was examined at once; it was swarming with ring forms. Quinine was given immediately by intramuscular injection, gr. xxx, and the diarrhœa stopped within a very few hours. The patient was up two days later. The complete bacteriological examination of the stools revealed complete absence of the cholera vibrio, or of vibrios of the paracholera group. A somewhat similar case, not so severe, which also had been taken for cholera, was seen by me in Northern Macedonia in 1915. This case also recovered very quickly on quinine. Cases of the same nature, though not so typically cholera-like, have been seen by me in islands of the Adriatic and at Salonika.

Colo-cystitis Syndrome.—I have seen three cases in Skopolje with all the symptoms of acute colocystitis due to calculi: severe pain shooting towards the right shoulder, tenderness in the region of the gall-bladder, severe vomiting. In two cases slight jaundice. The spleen was very slightly palpable in one case, liver enlarged in two cases. Blood positive for malaria in all three. All were completely cured by quinine.

Malaria simulating Abscess of the Liver.—I have seen one such case in Ceylon in consultation with a local doctor. The patient had developed his disease on an estate up-country where malaria is practically unknown, and he gave a history of having had dysentery ten years previously. When I saw him he had been suffering from intermittent fever for two months. The fever had not yielded to quinine (gr. xxx daily by the mouth): profuse sweatings, loss of flesh, spleen not palpable, liver enlarged but not very hard, severe pain on pressure all over the region of the liver. Blood said to have been negative for malaria every time it had been examined (four times). The day I examined the patient, however, the blood showed a few Laveran's crescents. An intramuscular quinine treatment supplementing that given by the mouth was ordered, and all the symptoms disappeared within three weeks.

For the benefit of the young practitioner in the Tropics, I may say, however, that mistaking abscess of the liver for malaria is a far more common error than mistaking malaria for abscess of the liver: while I have come across only one case of malaria diagnosed as abscess of the liver, I have seen a great many cases of abscess of the liver diagnosed as malaria and drenched with quinine for months, and even years.

Cirrhosis of Liver of Malarial Origin.—This condition in my experience is not very frequent. I treated a typical case, however, in 1915. The patient, a soldier, aged 23, with typical hepatic facies, had ascites. After tapping one could feel the liver and spleen enlarged and hard; the liquid soon collected in the peritoneal cavity, and the feet and legs commenced to become œdematous. After tapping again the liver was much smaller. After repeated examinations of the blood parasites were found, a quinine treatment cured the condition, though very slowly.

Acute Hæmorrhagic Pancreatitis Syndrome.—A man, aged 42, in apparently perfect health, was taken suddenly ill with violent pain in the epigastrium without any apparent reason. This was very quickly followed by very severe vomiting and complete collapse. There was a circumscribed area of very severe tenderness on the upper portion of the epigastric region, which was very tympanitic and seemed to be somewhat swollen. A diagnosis of probable acute hæmorrhagic pancreatitis was made by the attending physician and an operation suggested, but on examining the blood this was found to be swarming with malaria parasites. Quinine cured the condition very rapidly.

Pseudo-appendicitis.—I have seen several cases in the Balkans and two in Ceylon. A Serbian soldier in Skopolje in 1915 was suddenly taken with violent pain in the appendicular region; vomiting and fever, but no rigors; spleen and liver not enlarged; on palpation, severe tenderness and well-marked rigidity of the right lower abdomen. The blood showed numerous malaria parasites, and the patient got well within twenty-four hours after administering large doses of quinine. A Serbian colleague had a similar case, with all the typical symptoms of appendicitis. He examined the blood, but no malaria parasites were seen. A surgeon called in to see the patient decided to operate, and the appendix was removed. It was macroscopically quite normal.

On the third day after the operation the patient had a very severe rigor, and complained again of pain in the cæco-colon region, though more diffuse; his temperature jumped to 105° F., the spleen became palpable, and on examination the blood showed several subtertian rings. Quinine was administered by intramuscular injection, and the temperature dropped to normal within thirty-six hours.

The microscopical examination of the blood in these cases may be of great help; even if malaria parasites are not found, the polymorphonuclear leucocytosis of true appendicitis is often absent, though I must hasten to say there are several exceptions.

Pseudo-peritonitis.—A lady in Skopolje was supposed to be suffering from peritonitis due to some old uterine affection. She had low fever, pinched face, vomiting, severe pain and tenderness all over the abdomen. The spleen could not be felt, but palpation was difficult owing to rigidity of the muscles. The blood was examined by me, and found to be teeming with malaria parasites. Quinine cured this condition in a few days.

Diseases of the Respiratory and Circulatory Systems.—I would call attention to certain manifestations of malaria affecting the bronchi, lungs, heart and vessels. If the chest is thoroughly examined at the very commencement of an ordinary malarial attack, when the temperature just begins to rise, one will often notice a few dry râles, rather coarse, but the feature I should like to call attention to is that, not rarely, especially at the bases, very minute *crepitations* are heard which may possibly be of pleural origin; they generally disappear when the temperature has reached its acme. They are quite different from the crepitations one hears at times in patients who have been lying long in bed on their backs, as they do not disappear after a few inspirations. I have come across several cases, both in the Tropics and in the Balkans, of acute *dry bronchitis* of undoubtedly malarial origin, often with very little or no fever. One such case had been treated for months with expectorants and pot. iod. without any result, while a few doses of quinine made all the symptoms disappear. Similarly, I have come across a few cases of *dry pleurisy* of malarial origin, and two cases of consolidation of the lung of malarial origin closely simulating lobar pneumonia. One of the cases was taken suddenly ill with a rigor and fever after a cold bath, severe pain on the left side, cough with expectoration, which became bloody in the evening of the second day; at the right base tympanitic zone, which on the third day became somewhat dull, spleen just palpable. As the blood of the general circulation and the red cells in the expectoration contained numerous malaria parasites, quinine was given intramuscularly in large doses; the fever dropped on the fourth day. As regards the *circulatory system*, I have observed three cases of angina pectoris syndrome very severe completely cured by quinine.

Peripheral Arteritis is not very rare. One of my native assistants in Ceylon had several attacks of a peculiar condition: the superficial temporal artery of the left side used to become very turgid. I have never seen an artery become so big, and at the same time very hard and knotty to the touch, and extremely painful on touching. The attack at times came on without any fever with parasites in the blood. Quinine in large doses generally made the attack subside within forty-eight hours. I have seen cases of arteritis of the lower extremities ending in gangrene and conditions resembling Raynaud's disease. This malarial gangrene has been ably investigated at Salonika by Falconer and Anderson. I have seen cases of *intermittent claudication*, which cleared completely on quinine being given; also a case of erythromelalgia and acroparesthesia due to the same cause.

Of so-called functional affections of the heart, I have seen cases of palpitation, tachycardia, arrhythmia, and a typical case of heart block in a middle-aged man. He had had several attacks, slow pulse, epileptical seizures, visible auricular impulses in the veins of the neck, 3 : 1 rhythm. He denied ever having had fever. His spleen, however, was slightly enlarged, and very hard. The blood showed a few malaria parasites. A persistent quinine treatment freed him of his attacks.

Diseases of the Urogenital Organs.—Cases of malarial nephritis have been described; in men a neuralgia of the testicles; in women a neuralgia of the ovaries of malarial origin is occasionally met with. Epididymitis and orchitis have also been described. I have seen one case in Macedonia. The patient, who was living in a very malarious district, but had never had an attack of malaria, complained suddenly of severe pains in the testicles. When I saw him both testicles were swollen and very tender, but no signs of effusion or gonorrhœa. Temperature 101° F. Blood positive. Quinine caused all the symptoms to disappear in three days. I have seen a very interesting case of priapism of malarial origin. Blood positive. The condition, which had not been influenced in the least by full doses of bromides, hot baths, belladonna, &c., disappeared on large doses of quinine being given.

Skin.—Various skin eruptions may be seen in malaria, but on the whole—apart from herpes—in my experience they are not very frequent. In acute cases the most frequent is herpes labialis, then herpes progenitalis, seldom herpes zoster. I have seen various cases of diffuse erythema and a few of urticaria of malarial origin; also a peculiar patchy œdematous condition, which had been diagnosed as Calabar swellings and Quincke's œdema. I have seen a case of very severe scarlatiniform erythema of malarial origin, followed by desquamation in large flakes; also a typical case of erythema multiforme and one of erythema nodosum. Cases of purpura I have already described.

Papular rashes are very rare. A young European in Ceylon was suddenly taken ill with high fever, vomiting, extremely severe pains in the back. Two days later a papular eruption appeared; the papules were small and shotty, and very abundant on the face. The case was suspected to be one of incipient small-pox, until after repeated examinations malaria parasites were found in the blood. Quinine cured the condition quickly.

Pigmentation.—Everyone is acquainted with the earth-coloured appearance of the skin in chronic cases; at other times the skin is pale yellow or ashy grey. Very common are patches of hyperpigmentation (chloasma malaricum) and cases of diffuse pigmentation, with great loss of flesh and severe asthenia, closely resembling *Addison's disease*, are occasionally met with.

Before leaving the subject of malaria, I should like to say a few words on the diagnosis, prognosis and treatment of the malady.

Diagnosis.—The classical signs on which to base a diagnosis of malaria are, as is well known:—

(1) The periodicity of the fever.
(2) Spleen enlarged and hard.
(3) Specific action of quinine on the temperature.
(4) Most important of all, the finding of Laveran's parasites in the blood.

In the Balcanic zone one or two, or all of these features, may be absent in numerous cases.

To the young medical man going to that zone I would offer the following hints:—

(1) Whatever the type of fever and the symptoms of the case you have been called in to see, even in the presence of a syndrome pointing to an acute surgical condition, such as an appendicular colic, keep in mind the possibility of malaria.

(2) A negative blood examination is of no importance unless repeated with the same result very many times and at different intervals.

(3) The fact of quinine not influencing the fever does not always exclude malaria.

(4) While giving great importance to laboratory methods—it is only by this means that a positive diagnosis can be made with absolute certainty—do not neglect the clinical examination of your patient. Train your senses as much as possible. The importance of simple inspection, the importance of simple palpation, can hardly be exaggerated. A slight abnormality of the colour and pigmentation of the patient's skin, overlooked by the inexperienced, may suggest to the tropical clinician a diagnosis of probability in an obscure case, and, acting on it, he may perhaps save the patient's life. And in how many cases may not the faintest feeling of the tip of the spleen—impalpable to less trained hands—put one on the right track in a difficult case.

Prognosis.—In the Balkans, as in any other country, provided an appropriate quinine treatment be given, the prognosis is good in the enormous majority of cases. It must be remembered, however, that (1) in pernicious cases a high mortality may be present, notwithstanding an energetic quinine treatment. (2) In a large number of cases, even of the usual benign cases, the cure which is brought about by an appropriate treatment is merely clinical, viz., the patient feels well and shows no signs of the malady, except perhaps a persistent large mononuclear increase, but a complete sterilization is not achieved. The affection remains dormant for months and years, and any cause lowering the resisting power of the individual, such as chill or a traumatism, may cause the acute symptoms to recur in patients in England ten and fifteen years after leaving the Tropics. This, after all, is very much in analogy to what one sees in certain other protozoal diseases—syphilis, for instance, yaws and sleeping sickness. I have mentioned traumatism; an operation, for instance—the simplest operative act—may re-awaken a very old dormant malarial infection; the patient shortly after the intervention may have a rigor, the temperature rapidly rises to 104° or 105° F., very severe vomiting sets in, symptoms which may cause a great deal of anxiety to the surgeon, who naturally may be very far from thinking of malaria.

Treatment.—In my experience the treatment of malaria in the Balkans, as in any other country, may be described in the one word, *quinine*. Only, the drug must be given in very large doses, 30 to 60 gr., and even more, daily. It should be given by the mouth in ordinary cases, by intramuscular injection in serious cases, intravenously in the pernicious forms. In the many years I have practised in the Tropics, and during the last two years in the Balkans, I have given almost numberless injections of quinine without any bad results, except a slight local infiltration at the place of injection. It is, of course, essential that the solution should be accurately prepared and sterilized; the simplest way is to use ampoules, containing each gr. xv of hyd. of quinine, obtained from a reputable firm. Of the enormous advantage of using intramuscular and intravenous injections of quinine in serious cases I have no doubt whatever; they are a means of saving life in many pernicious cases. I well remember a certain hospital in Serbia in which the mortality for pernicious malaria was practically 100 per cent., being reduced to less than 20 per cent. after the injection treatment was introduced.

The administration of quinine in very large doses, apart from the usual tinnitus aurium, very seldom gives rise to serious symptoms. Twice I have come across cases of partial amaurosis due to quinine; the condition disappeared on the drug being discontinued for a few days. It is most important to differentiate quinine amaurosis from malaria amaurosis. In the former the pupils are generally widely dilated and do not react to light; in the latter reaction to light is present.

While quinine in my opinion is the most powerful drug we have in the treatment of malaria, and in a general way may be called a specific, it must be admitted there are cases of malaria which respond very slowly, or not at all, to a simple quinine treatment.

In such cases other drugs have been tried, among which I may mention picric acid, methylene blue, antimony, arsenic—and of arsenic, both the old preparations, liq. arsenicalis, arsenious acid, and the more recent compounds, such as atoxyl, salvarsan, galyl, &c. In my experience, when given alone, none of these drugs has any marked effect on malaria. When given, however, in association (sometimes alternatively) with quinine they are useful in certain cases, and seem to increase the effect of the latter drug. The efficacy of a combined quinine-arsenical treatment in certain forms of the malady has been recognized since many years, and has been extensively used by myself in the Tropics. A combined treatment which has given me satisfactory results in certain cases, in which quinine alone was acting very slowly, is a combined quinine-phosphorus-tartar emetic treatment. The patient takes daily a dose of the following quinine-tartar emetic mixture:—

Quin. sulph.	gr. x
Ac. sulphur dil.	♏ x.
Tartar emetic	gr. $\frac{1}{6}$ – $\frac{1}{4}$
Codein	gr. $\frac{1}{6}$ – $\frac{1}{4}$
Syr.	ʒj
Aq. chlorof.	ad ℥j

℥j t.d. or every four hours, well diluted in water.

In addition to taking daily this mixture, the patient is given one day an intramuscular injection of quinine hyd. (gr. xv), and the next day a subcutaneous injection of m. 1-4 of phosphorated oil. The phosphorated oil should be of recent preparation, and may be diluted with sterile oil. The injection is made subcutaneously in the arm, just like an ordinary injection of morphia. At the time of the injection the patient feels no pain whatever, but after a few hours some pain may be felt, which, however, is not very severe, much less so, for instance, than after an emetine injection. I have used phosphorated oil by subcutaneous injection for many years in the treatment of various diseases, such as osteomalacia, rickets, leukæmia, &c., and I have never had any untoward accident. The treatment, of course, must be carried out with all due caution and care. Neither antimony nor phosphorated oil, when given alone, have any distinct effect on malaria; they seem to act as coadjuvants.

Prophylaxis.—I will limit myself to stating that in my opinion both methods of prophylaxis—the one based on anti-mosquito measures and the one based on the preventive administration of quinine —should always be used together. Relying exclusively on the one or the other may be the cause of unsatisfactory results in practice. As regards anti-mosquito measures, the destruction of larvæ by oiling all pools and ponds near camps, hospitals, &c., is by far the most useful. The details can be found in any text-book. Anti-mosquito protection by means of mosquito nets, mosquito masks, such as the Simpson mask, &c., should also be carried out. Chemical preparations to keep off mosquitoes are occasionally advantageous. The best is citronella oil; a more agreeable preparation to use is menthol powder: Menthol gr. ii-v, Zinci ox. ℥i. As regards prophylaxis based on quinine administration, the usual dose of gr. v daily is utterly inadequate in the Balkans. The daily dose should be increased to at least gr. viii or gr. x, and even these doses are at times insufficient to prevent infection.

(*To be continued.*)

Notices.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JULY 16, 1917.

THE LATE SIR GEORGE C. M. BIRDWOOD.

THE death of Sir George C. M. Birdwood, K.C.I.E., C.S.I., M.D., LL.D., has removed from amongst us one of the most gifted men that ever followed the profession of medicine. The son of a soldier, he was born in Belgaum, in the Deccan, in 1832. He left India when 7 years of age, and after attending a school in Plymouth he was sent to Dollar Academy, Clackmannanshire, Scotland, and afterwards studied at Edinburgh, where he graduated in medicine in 1853. In the following year he went to India on the Indian Medical Staff, and was quartered in Bombay. He was in India during the Mutiny, but he was not allowed to leave Bombay, where he was busily engaged in the military and civil work of his profession. These, however, did not prevent him taking interest in other matters, and even at this early stage of his acquaintance with Indian natives he exercised so marked an influence upon them that it has been said that to Surgeon Birdwood was owing in a great measure the loyalty of the city during the stirring times of the Mutiny. This extraordinary power remained with him all through his career, and helped to frame his destiny and direct his thoughts and talents. During his professional life in Bombay he held Professorships at the Grant Medical College, Bombay; was Registrar to the University, Curator of the Museum, Secretary to the Bombay Branch of the Royal Asiatic Society, and one of the founders of the Victoria and Albert Museum and the Victorian Gardens, Bombay. He was also a J.P. and Sheriff of Bombay.

Scholarly, scientific in the widest sense, an organizer of marked capacity, judicial and judicious, he delighted in work of almost every kind, for medicine was but one of his interests. When he was but 40 years of age he left India in 1868, to his great sorrow, owing to bad health, and came home, as he said, to die. Fortunately, his dread was not justified, for he recovered, and only the other day—June 28, 1917—died at the advanced age of 85.

Shortly after coming home in 1868 he held a post as a permanent official in the India Office under that distinguished man, Dr. Forbes Watson, Reporter on the Products of India, whom he eventually succeeded. He held office as Special Assistant in the Statistics and Commerce Department of the India Office from 1872 to 1902. In this capacity he was brought into association with exhibition work, and he practically was in charge of, or supervised, all the Indian Collections from the Paris Exhibition of 1867 down to that of Chicago in 1893. He was given the C.S.I. in 1887, and amongst other honours received he was made K.C.I.E. in 1887.

India and its affairs naturally occupied most of his thoughts, and most of his contributions were papers appertaining to India and its affairs. His paper on "Competition and its Effects on Education, with special reference to the Indian Civil Service," was published in 1876. Other papers followed: "The Native Press of India," in 1877; "Quest and Early European Settlement of India," 1879; and "Indian Pottery at the Paris Exhibition" in the same year. Of these distinctly the most important was the one on the Native Press.

His writings on India covered many subjects: industrial art of every sort, botany, medicine, etymology, and folk-lore. He was especially devoted to the Royal Society of Arts since he first joined that Society in 1875, and only the day before he died he wrote saying that he deeply regretted he could not attend the annual meeting of the Society which was to be held the following day.

He was a voluminous and copious writer, sparing neither time nor trouble in his work. He left behind a vast mass of literature, but the bulk of it was in the form of reports, papers in the Transactions of various societies, contributions to magazines, articles and letters in newspapers, and introductions, prefaces, or appendices in books of others—for he was ever ready to help in this way anybody who asked him. His most important books may be said to be "The Industrial Arts of India" (1880), his "Report on the Miscellaneous Old Records of the India Office" (1879), and the beautiful illustrated book, of which he was only part-author, "Relics of the Honourable East India Company" (1909). The most characteristic of his writings was the volume consisting of a republication of various articles, which was issued in 1915 under the mysterious title of "Sva." Sva appears to be a Sanskrit word or syllable, and its mysterious character somewhat evaporates when it is reduced to the more familiar Latin equivalent *Sua*.

The range of his writings was as wide as his own interests. There was hardly any subject on which he was not prepared to write a pungent comment—often wise, generally humorous, frequently eccentric, and, especially of later years, inevitably outspoken. On art, especially all Eastern art, he was a genuine authority, as indeed he was on all matters connected with India. But he also possessed a vast store of recondite and out-of-the-way information on subjects the most diverse, and this was always at the service of his friends.

Fluent and ready as was his pen, he would devote unstinted pains to revision and elaboration. For him anything fresh or unusual had a special charm, and his artistic soul cared little or nothing for scientific accuracy. Paradox was to him a source of infinite joy. Perhaps this was the reason why he—a man of genuine but highly unorthodox religious opinions—took a delight of late years in dating his letters in accordance with some mysterious Calendar of Saints, the roll of which seemed to be known to him alone. But in all he wrote, and in all he said, there was a certain delightful inconsequence that gave it a special charm. Editors were always glad to get his notes, which were unlike those of any other contributor; and though they sometimes had to excise and condense, he never seemed to mind so long as the alterations and erasures were not forced upon his notice.

His personality was, like his writings, unique in the literal sense of that much-abused word. He had a host of friends and they all loved him. There was nobody like him—quaint, generous, and liberal to a fault. He was always ready to help a friend—even if the friend did not want his help—with his influence, by his pen, or out of a purse which could never have been over well stocked.

With the natives of India he had a marvellous influence, and to those of them who came to England he was a staunch and valuable friend. He was himself saturated with Eastern ideas and appreciative of Eastern ways. Probably nothing gave him more delight than that, year by year, on his birthday his Indian friends used to decorate with flowers the bust of him, by Alfred Gilbert, which had been presented in 1900 to the University of Bombay.

Although he did not practise medicine since he came from India to live in England, yet it was the study and practice of medicine that showed the way to the development of his gifts and his high attainments, a fact which is noticeable also in the career of many other men of genius, whether in science, in law, in capacity for government and public affairs, as witness a Huxley, Sir William McGregor, Sir William J. Collins, Dr. Addison, and many others, whose education was in the study of medicine.

Sir George Birdwood's knowledge covered a range of subjects beyond the powers of most men of his day, for, in addition to the contributions mentioned above, we find him writing on "Incense" in the Encyclopædia Britannica, "Aryan Flora," in Max Müller's "Biography of Words," on the "Miracle Play, Hasant Hasain," "Eastern Carpets," and many other by-paths of literature of commanding interest.

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Annotations.

Oxygen Treatment of Carbon Monoxide Poisoning.—M. Nicloux (*Presse Médicale*, March 15) found that one volume of CO acts like 220 volumes of O. When the gases in this proportion are brought in contact with blood half the hæmoglobin becomes monoxidated; the rest becomes oxygenated. With air the proportion would have to be 1:1000. In animals deeply intoxicated with CO nearly the whole disappears from the blood in one hour of oxygen breathing. Poisoning with CO should be treated with pure oxygen as soon as possible.

Molar Tooth Sign of Hereditary Syphilis (Sabouraud, *Presse Médicale*, March 15).—A supernumerary cusp on the inside of the first molar in the upper jaw is often the only sign.

Treatment of "Barcoo Rot" (J. R. Hickinbotham, *Brit. Med. Journ.*, June 23).—In Western Australia it is cured by giving a mixture containing 15 gr. of potassium nitrate and 15 minims of spiritus ætheris nitrosi three times a day. Locally, the sores were treated with a weak ammoniated mercury ointment and covered up from flies and dirt. The idea, of course, is to get the kidneys to do their proper work. This in hot climates is usurped by the skin, not always quite satisfactorily.

Abstracts.

POISONING BY HYDROCYANIC ACID GAS.[1]

By A. M. McIntosh.

Some rooms in Brisbane were in course of fumigation by cyanide gas under the supervision of a trained chemist, who had had considerable experience of this work. The accident occurred in connection with the treatment of a small room of 1,300 cubic feet capacity. The quantities of chemicals used were:—

Potassium cyanide	24 oz.
Sulphuric acid	24 fl. oz.
Water	48 ,,

The method adopted in this particular case was not one that would commend itself to men experienced in the use of hydrocyanic acid gas for disinfection purposes. The cyanide was first placed in a dish, the water and sulphuric acid mixed, and the mixture then poured on to the cyanide. The room had previously been sealed, with the exception of one door for exit, and the addition of the fluid to the cyanide caused a great evolution of gas, with the result that the operator inhaled sufficient of it to make him dizzy. He immediately dashed from the room, and called to his assistant to close the door and seal it up. Assistance was summoned, and, on arrival, it was found that the former had quite recovered from the effects of his inhalation; but when the room was visited the assistant was seen lying on the floor unconscious, with his head near the dish containing the cyanide. This was about three minutes after the officer had left the room. He was quite unconscious, his breathing had stopped, his pulse could not be felt, and he had lost his corneal reflex. He was hurriedly pulled out of the room and carried into the open air. With artificial respiration he began to breathe, at first slowly; oxygen was administered, and strychnine sulphate, gr. $\frac{1}{20}$, hypodermically. When he was discovered his face was very pale, later it became more pink than normal; his breathing, at first six to the minute, gradually increased to normal, and was very stertorous in character. His pulse gradually became stronger, and his corneal reflex returned. A pinkish, frothy mucus collected in his mouth, and necessitated the constant cleaning out of his throat for some two hours after he was found. At this time he was given a hypodermic injection of atropine sulphate (gr $\frac{1}{100}$), with the result that the exudation was greatly checked. His temperature was now about normal, his face slightly flushed, and his respiration continued laboured and stertorous; all his limbs were flaccid, his urine and fæces were passed involuntarily, and his pupil reacted sluggishly to light. Later in the afternoon he began to have general convulsive seizures, closely resembling those of tetanus, with a typical *risus sardonicus*. These seizures lasted about five minutes, and recurred at intervals of ten minutes. He was given two injections of morphine, $\frac{1}{4}$ gr. in all. This somewhat diminished the violence and frequency of the convulsive seizures. Next morning he could swallow a little, and was given brandy and water at intervals. He was still passing urine in the bed. On this day the spasms were much less frequent and severe. Lumbar puncture was performed, 14 c.c. being withdrawn under slightly increased pressure. The fluid showed no departure from normal. At this time 20 c.c. of hydrogen peroxide were injected subcutaneously. It was noted that the Babinski reflex was positive on both sides. His knee-jerks were very sluggish; there was no ankle clonus. Towards evening his breathing became more and more stertorous, and he was very restless during the night, moaning off and on; the spasms also occurred with greater frequency. His urine was examined and found to contain a considerable amount of pus, but there was no trace of any hydrocyanic acid nor any other abnormality.

On the succeeding days there was little change in his nervous symptoms. The spasms recurred with less frequency as time went on, and also diminished in severity; during the spasms he moaned as if in pain. His temperature gradually rose; his heart was normal throughout. No abnormality was noticed in his lungs, except a short time before his death, when there were some moist sounds at the bases.

His pulse became much weaker and softer, and he died 110 hours after inhalation of gas. His temperature rose to 106° F. a few hours before his death.

A post-mortem examination was carried out, and the only abnormality found was a slight congestion of the cerebral convolutions and a well-marked pyelitis, this latter being due to a long-standing gonorrhœal infection. The whole of the brain was very carefully examined, but no abnormality was apparent to the naked eye. Some of the blood obtained at the post-mortem examination was submitted to the Government analyst, who was, however, unable to find the slightest trace of hydrocyanic acid or any of its compounds.

HYDROCYANIC ACID POISONING.

The following is taken from the *Medical Journal of Australia*, April 28. Lieutenant-Colonel McIntosh relates the details of a highly interesting instance of poisoning by hydrocyanic acid gas. While the symptoms, with one exception, were similar to those usually met with in this form of poisoning, the case presents certain peculiarities which may be of use in determining the mechanism of poisoning. In this case a man was exposed to an atmosphere containing an unknown concentration of hydrocyanic acid vapour for a period of about three minutes. His respirations had stopped, and he was very pale when found. Notwithstanding the violence of the symptoms, the man recovered from the immediate effects of the vapour, and although he exhibited tetanoid symptoms, with disturbed consciousness, characteristic of the more chronic forms of hydrocyanic acid poisoning, he survived for four and a half days—a length of time which is unusual. The one symptom which, as far as we are aware, has never been described before is the gradual rise of temperature. In hydrocyanic acid poisoning the temperature falls suddenly, and rarely reaches the normal level again before death. The blood was examined after death, but no trace of cyanogen was discovered. Many observations have been carried out in these cases, and it has been determined that the sojourn of hydrocyanic acid in the blood is brief, usually not longer than twenty-four hours. Later it appears in the tissues as sodium cyanide, followed by an extraordinary reduction in the oxygen intake of the tissues. This reduction of metabolism is obviously induced by an action on the nerve centres, and is not due to a direct action on the tissues themselves. The tissues are prevented from taking up the normal amount of oxygen from the blood, and consequently the output of carbon dioxide is also diminished. A second consequence of this change is the increase in quantity of lactic acid and sugar in the blood. In the more chronic forms, such as existed in the case described, the disturbance of the oxygen metabolism becomes less marked as time goes on, but even during the cramps the oxygen content of the tissues is lowered and the carbonic acid content of the blood never reaches the normal. Whether this state of affairs can last for four and a half days cannot be said, since no measurement of the carbonic acid excretion was undertaken. The fact that the heart remained normal throughout the course suggests that it did. The objective result of the diminished intake of oxygen by the tissues and the restriction of the carbonic acid output would be a gradual failure of the respiratory centre, due to the absence of natural carbonic acid stimulation. The fever remains unexplained, unless indeed we can assume that the lowered metabolism induced a reduction of resistance toward the renal affection, and a consequent increased manufacture of bacterial toxins from this focus of infection. The changes discovered after death correspond to those usually met with, although it is not infrequent to find minute hæmorrhages in the brain in chronic cases. At times these hœmorrhages are sparsely distributed over the white matter of the cerebrum and medulla, and may be so minute as to be detectable only under the microscope.

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[1] Abstracted from the *Medical Journal of Australia*, April 28.

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Reviews.

Kala-azar: its Treatment. By U. N. Brahmachari. Pages 121 + v. Butterworth and Co., Calcutta. 1917. 8s. 6d. net.

It is a pleasure to read a book entirely devoted to one subject in all its phases, especially on such an important disease. The author is to be congratulated on embodying his wide and unique experience in the first book in any language on the subject. In such an important and fatal disease it is only to be expected that various treatments have been invented and investigated; and it is well to adopt any means that relieve symptoms or complications of which there are so many, even when these means have attained all that was hoped for. This the author has done; he also explains the results obtained in India with arsenic and other preparations. Minute details are given of treatment by antimony in all known forms, and their method of use is described; in particular, their administration by intravenous injection, with all possible complications.

The work merits the attention of all who have any prospect of coming in contact with the disease, and will add greatly to the knowledge already possessed by those who have treated it.

Practical Sanitary Science. D. Sommerville. Pp. 328. Second Edition. London: Baillière, Tindall and Cox. 10s. 6d. net.

Sanitation in the Tropics is even more important than at home, because it is occupied with special difficulties; yet it is necessary for most tropical residents and officials and all practitioners to be acquainted with laboratory work in all matters of sanitary science that occur at home.

The whole range of public health is covered, from air, water, water sediment, sewage soil, disinfectants and food, including dairy produce, cereals, meat, drink, condiments, and clothing. Especially useful are the photomicrographs of food products of substances used for clothing and manufacture. The information is of practical use to officials, planters, traders, and manufacturers. The book is convenient to hold, easy to read; the well-arranged table of contents and index makes it handy for ready reference.

◆

Trichophyton Blepharociliary (Chabé, *Archives de Médecine et Pharmacie Navale*, May).—The patient was admitted to hospital prior to invaliding from the Service.

In February, 1916, he was diagnosed as having eczema of the eyelids and conjunctivitis. In April he entered hospital with "eczema" of ocular region, eyebrows and lids covered with crusts, conjunctivitis, and photophobia. In July he was discharged but little improved.

At the end of October he was re-admitted with the eyelids red, swollen with yellow crusts. The same, but less marked, on the eyebrows, with patches on the scalp. Treatment produced little effect. It was noticed that some eyelashes were broken; under the microscope *Trichophyton endothrix* was seen; the ineffectual local medication was replaced by X-rays at 22·5 c.c., four units H twenty-eight minutes to one eye, ten days later thirty minutes' exposure to the other. In three weeks X-rays were again used. At the end of January, 1917, the patient was discharged; the eyebrows and lashes had commenced to grow. References are made to Sabouraud (*Traité des Teignes*) and Hallopeau (*Annales de Dermatologie*, 1902).

Original Communications.

A NEW THRUSH PARASITE.

By A. Pijper, M.D.Bethal, Transvaal.

A child of four months, in very bad condition due to underfeeding and exposure to cold, was seen exhibiting the usual symptoms of thrush, but for the colour of the patches. These were distinctly not white or whitish, but yellowish. A whole patch was taken off (slight bleeding followed) and planted on Sabouraud's *milieu d'épreuve*. Better care and alcoholic paintings soon restored the child to health. The patch on Sabouraud's agar gave rise to an abundant and pure culture of a fungus. Subcultures were less rich, but still always rose to several millimetres above the surface of the medium. They are much crinkled and of an amber-yellowish colour. On ordinary agar the growth is less rich and less wrinkled and a duvet soon appears. The same holds true for gelatine cultures. On potato it grows well without forming a duvet. On all culture media, when they have stood for weeks, a brown pigment is produced, which invades the whole medium. It is interesting to note that on solid media spiral hyphæ deeply penetrate into the medium. Smears from cultures under the microscope are seen to consist of yeast-like cells, reproducing by budding, and mycelial threads. These threads are sometimes branching, not always septate, and of varying thickness. They usually end in ovoid elements, but sometimes these elements are seen originating laterally (fig. 1.) True chlamydospores are absent. These data seemed to characterize this fungus as a monilia. Castellani has taught us to differentiate between twenty-seven sorts of monilia principally by means of sugar reactions.

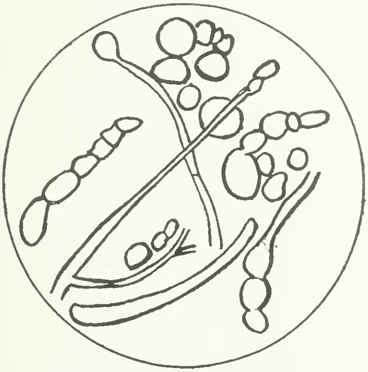


Fig. 1.—Magnification ± 900.

On trying these and other reactions I found:—

No formation of gas in maltose-, glucose-, saccharose-, lactose-, dextrin- and mannite-broth.

Formation of acid in maltose-, glucose- and saccharose-broth, not in lactose-, dextrin- and mannite-broth.

Litmus milk is rendered slightly acid.

Broth remains clear, no indol is formed.

Gelatine is not liquefied.

Serum is slightly discoloured.

These reactions, together with the amber-yellowish colour of the culture on Sabouraud's maltose-agar, identified the fungus as *Monilia rugosa* Castellani. It is a pleasure to me to be able to state here that this author, after very kindly inspecting my cultures and slides, completely confirms this opinion. I must add that in the *Manual of Tropical Medicine* Castellani already expressed doubt as to the classification of this fungus among the moniliæ. On further examina-

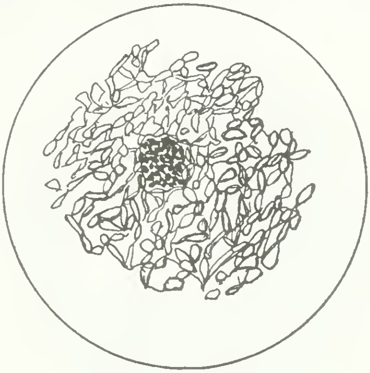


Fig. 2.—Magnification ± 500.

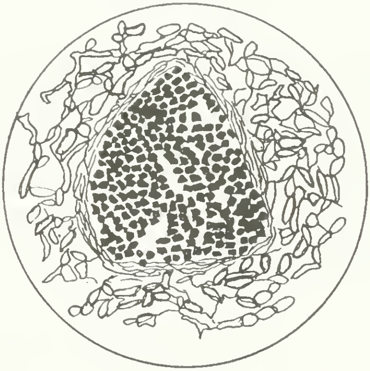


Fig. 3.—Magnification ± 500.

tion I found that there was reason for this doubt. When a culture on Sabouraud's maltose-agar after seven days' growing is hardened and cut into sections a new modus of reproduction becomes apparent. The next days bring the further stages. Figs. 2-4 illustrate this. It is clear that fertile hyphæ become enveloped in a perithecium of sterile filaments, and that in these structures conidia are formed. Fig. 4 shows a few conidia in the centre. They are of a brownish colour and do not stain with ordinary agents. Gradually the contents of the perithecium are totally converted into conidia, and then the perithecium bursts. Though not the whole development is clear, there is no doubt but this is an ascus-formation. We therefore have to place this fungus among the *Ascomycetes*, and more definitely among the *Carpoascees*, into the family of the Perisporiaceæ. I have not succeeded in finding evidence to bring this fungus into the genus *Penicillium*, *Sterigmatocystis*, or *Aspergillus*, and as a consequence to the finding place of this fungus being an isolated part of South Africa, I am not in a position to carry out the complete classification of this thrush-parasite.

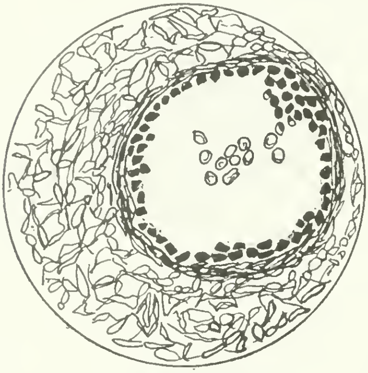


FIG. 4.—Magnification ± 500.

NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.

By Lieutenant-Colonel ALDO CASTELLANI, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

Continued from p. 164.

TYPHUS EXANTHEMATICUS.

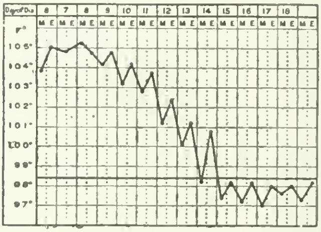
In reference to this malady, which, according to certain observers, has killed off nearly one-tenth of the Serbian population during the years 1914-15, I would like to make a few remarks on the following points:—

(1) The rash.

(2) Course and duration of the malady, certain sequelæ, and complications.

(3) Prophylaxis.

Rash.—Definite preliminary rashes are rare; what one generally sees is a very marked flushing of the face, neck, and upper portion of the chest, with a subcuticular mottling of the skin of the lower part of the chest and abdomen (*cutis marmorata*). This feature was present in about 80 per cent. of the Serbian cases during the second and third day of the malady. It should be noted at once that this symptom is far from being specific; it was extremely common—in fact, almost constant—in the very numerous cases of Pappataci fever I saw in the Skopolje district and other parts of Macedonia, as I will mention later. The true typhus rash appeared generally on the fourth or fifth day in the form of small roseola spots indistinguishable from typhoid roseola, except that it was often much more abundant. It generally started on the abdomen, and then spread to the chest, arms and legs. On the last two places, however, it was rare, this being contrary to what one reads in text-books. The spots are at first all roseola-like and disappear on pressure, then some of the spots slowly fade away, while others become of darker hue and do not disappear on pressure, but seldom become so dark-bluish as in purpuric conditions.



Typhus exanthematicus. Dr. G. C. Shattock's case.

According to my experience, it must be admitted (1) that the rash may remain purely roseola-like without any of the spots becoming petechial; it is then indistinguishable from enteric rash, but for its profuseness in most cases. It should be noted however, that certain cases of enteric may have a profuse rash; one such case in Skopolje turned out to be paratyphoid B, the patient being covered all over the body with a roseola rash. (2) There are cases when the rash is not only permanently roseolar, but is extremely scanty, and may be altogether absent. The newly arrived medical man should be on his guard not to mistake typhus rash for a petechial rash, which I have called *Balcanic rash*, composed of innumerable, perfectly circular. dark-red petechiæ, which is extremely common in the Balkans in peasants and soldiers. I have many a time seen a patient taken to the typhus wards merely because he had fever (often malaria) and this petechial rash, which is merely due to multiple bites of innumerable fleas. Anyone who has not been to the country can hardly believe how profuse this rash can be; the whole body, with the exception perhaps of the face, is completely covered with it, while the shirt of the sufferer may be absolutely black from the numbers of living fleas upon it. With a little practice one soon learns to easily distinguish the two rashes; each flea-bite shows at first a central hæmorrhagic spot surrounded by a hyperæmic circular zone, which disappears on pressure. This peripheral hyperæmic zone fades away spontaneously within a day or two, while the central hæmorrhagic spot remains as a "petechial" area, which is, as a rule, perfectly circular, not raised, and of a dark red colour, which does not disappear on pressure.

Course of the Malady: Complications and Sequelæ.—The disease begins generally suddenly with pains all over the body, a feeling of great prostration and, occasionally, rigors; but cases in which the onset is slow, somewhat typhoid-like, are far from rare. On the average the duration of the fever in my cases was from fourteen to eighteen days. In 80 per cent. of the cases the fever will not come down by crisis, as usually stated, but by lysis, lasting in general three to five days, but occasionally much longer. I have occasionally seen relapses; only once a reinfection (interval between the two attacks was four months). I would call attention to the frequent co-existence in my experience of typhus and relapsing fever.

The commonest complications and sequelæ I have observed were, in order of frequency, parotitis, often coming to suppuration, gangrene of the feet, polyarthritis, neuritis. Several cases developed during convalescence symptoms of severe depression amounting to melancholia.

As regards the *prophylaxis* of typhus, I am a believer in the efficacy of taking every possible measure against lice, especially the sterilization of all soldiers' underclothing and uniforms at fixed intervals, and frequent bathing. As regards the use of various substances to keep away lice from the body, most are in practice rather disappointing, but may be useful in certain cases. Dr. Thomas W. Jackson and myself carried out a number of experiments on the subject in Serbia in 1915, and came to the following conclusions (see JOURNAL OF TROPICAL MEDICINE AND HYGIENE, November 15, 1915):—

(1) In regard to solid and liquid insecticides, the substances which we have found to be deleterious to body lice (*Pediculus corporis* de Geer 1778) are, in the order of their efficiency:—

(1) Kerosene oil and petrol.
(2) Plain vaseline.
(3) Guaiacol.
(4) Anise preparations.
(5) Iodoform.
(6) Lysol, cyllin, and preparations of similar type.
(7) Carbolic acid solution (5 per cent.).
(8) Naphthalene.
(9) Camphor.

We found that pyrethrum had a very feeble action, while boric acid, sulphur, corrosive sublimate and zinc sulphate, when used in powder form, had apparently no action whatever. As regards bedbugs, kerosene oil is the best insecticide. Next to it comes guaiacol.

(2) It is interesting to note that substances which are powerful licecides may have very little or no action on bedbugs, and vice versa. For instance, iodoform which kills lice in ten to fifteen minutes has practically no deleterious action on bedbugs, which may live for more than twenty-four hours when exposed to it. Iodoform has also very little effect on fleas. Pyrethrum, on the other hand, has a much more powerful action on bedbugs than on lice.

(3) For use against lice on a large scale, as among troops or prisoners, perhaps the best insecticide powder is naphthalene. This substance has a lower licecide action than kerosene oil, guaiacol, iodoform, and anise preparations, such as onethol; but it has a less displeasing odour than the first three named, and is much cheaper than onethol powder. In stored blankets and clothing it is also practicable and of use, as frequently lice are found upon the clothing and blankets stored through the summer. Naphthalene is useful also for its well-known deterrent action upon moths. We are speaking here of insecticide powders. As regards liquid insecticides, the American Sanitary Commission gave sanction to kerosene by using it daily on troops and prisoners.

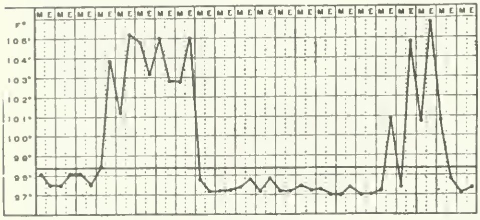
(4) For the better class of patients in practice a menthol powder (menthol gr. iii-v, zinci. ox. 1 oz.) is to be preferred to naphthalene in most cases, as the odour is not displeasing, while it is repellent to mosquitoes, in addition to lice and fleas. Such powder is especially useful in summer and in hot countries, as it has a cooling effect on the skin and often prevents prickly heat.

(5) As regards the use of ointments for killing lice, plain vaseline is efficacious, and it is doubtful whether the addition of white precipitate, calomel, &c., is of much value, except as hastening the healing of secondary pyogenic lesions so common in individuals infested with lice.

RELAPSING FEVER.

Relapsing fever was extremely common in Serbia in 1915, in the spring especially. It was not rare in 1916 among the Serbian troops after the retreat through Albania, and cases have been seen by me again in Macedonia this winter. I would call attention to the comparative frequency of mixed infections which were seen in 1915: typhus exanthematicus + relapsing fever; malaria + relapsing fever. In Skopolje in 1915 it was extremely common to see relapsing fever developing in convalescents from typhus. The frequent co-existence of the two diseases is probably explainable by their being carried by the same insect, the louse; though, personally, I am inclined to believe that relapsing fever is carried also by bedbugs. As regards the etiology of the disease, I believe that, as I hope to demonstrate in a future publication—and as is the case in Africa, America, and Asia—the disease is also in Europe due to several species of spirochætes, and not to one only (*S. recurrentis*, Obermeier). As regards clinical symptoms, I would point out how extremely difficult it is to diagnose from purely clinical symptoms at the onset of the first attack, relapsing fever from typhus, malaria, and Pappataci fever. A positive diagnosis can be made with certainty only by means of the microscope. It must be noted, however, that at times the spirochætes are very rare.

I would call attention to two skin features I have seen, the so-called *cutis marmorata* and *flushing of the face*, very frequent, and occasionally a very fine rash composed of very small, roundish, delicate, pinkish or red roseola spots on chest, abdomen, and trunk, even in cases in which a mixed infection with typhus or enteric could be excluded with certainty, as the fever dropped on the fifth or sixth day. On the whole, though relapsing fever is certainly a serious disease, it is not very dangerous, and the mortality is low—in my cases was less than 3 per cent.



Relapsing fever.

In the treatment of the malady I have found salvarsan, neosalvarsan, and galyl to be fairly efficacious when given intravenously in 0·3 grm. doses, but there are a certain number of cases in which the results are disappointing. I have obtained better results by a combined treatment—salvarsan and tartar emetic. Tartar emetic given alone seldom cuts short the first attack of fever, but in a certain number of cases it apparently prevents the relapses. I have given tartar emetic intravenously, using the usual 2 per cent. solution (4-8 c.c.), or the following formula:

Tartar emetic	4 grm.
Sol. ac. carbol, 1 per cent. ...	100 cc.

Half to 2 c.c. is diluted at the time of injection with sufficient sterile saline to bring it to 5 c.c., and the whole injected into a vein, taking the usual precautions.

In conjunction with the intravenous administration of the drug, I have given it in certain cases also by intramuscular injection (see *British Medical Journal*, October 21, 1916 for formula) and by the mouth in the form of my yaws mixture, which contains tartar emetic, potass. iodid., sodii salicyl., sodii bicarb. (see Yaws). Care should be taken to stop the drug during the crisis, or unpleasant symptoms of collapse may appear.

PAPPATACI FEVER.

This fever is extremely common in summer all over the Balkans and the Adriatic zone. The so-called Uskub or Skopolje fever, epidemics of which occur regularly every year in Skopolje and surrounding Macedonian districts, I found out to be also Pappataci fever. *Phlebotomus papatasii* is extremely common in certain Macedonian districts. It is generally stated that the insect bites only in darkness, but I can confirm the observation made in India by Hugo that it bites also during the day. The disease, but for the rash, is very similar to dengue, as I have seen it in the Far East and Ceylon. It begins suddenly with rheumatoid pains all over the body, headache, pains in the eyeballs, fever, no rigors. The face is flushed and has often the appearance of being slightly swollen. The flushing is often so marked and severe as to amount to an erythematous rash, which often involves the neck, too. The conjunctivæ are injected. I would call attention to the appearance of the skin of the chest, and at times of the abdomen, which shows frequently a delicate subcuticular mottling—*cutis marmorata*. The fever keeps high (102° to 104° F.) for thirty-four to forty-eight hours; it then drops by crisis on the third day. Occasionally the fever lasts for four or five days, and may not drop so suddenly. Some of the superficial lymphatic glands may be enlarged.

I would like to make a few remarks on the following points:—

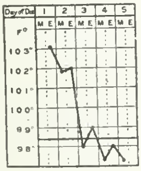
(1) The erythematous flushing of the face and neck and appearances of fauces.

(2) Differential diagnosis between Pappataci fever and typhus at onset.

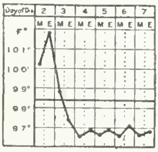
(1) A feature of the well-known erythematous flushing of the face and neck has apparently escaped previous observers. This flushing is persistent—that is to say, it lasts long after the fever is over—eight, ten, twelve, and even fifteen days—fading away very slowly. In the Skopolje wards it was not difficult to distinguish among the convalescents of various diseases those who had had Pappataci fever from this peculiar sign. As regards the appearance of the fauces, not only is there the usual congestion of tonsils and pharynx common in most acute fevers, but the mucosa of the soft palate presents a peculiar appearance—small hyperæmic roundish spots—the eruption being sharply limited by a line of demarcation between the soft and hard palate. This appearance of the soft palate is not, of course,

peculiar to Pappataci fever, and may be found, for instance, in cases of relapsing fever and typhus, and in certain cases of malaria; it is rare, however, in typhoid. This appearance of the soft palate often persists for several days after the fever is over, in the same way as the flushing of the face.

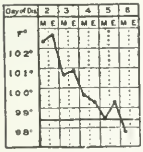
Diagnosis between Pappataci Fever and Incipient Typhus.—When in the Balkans a patient is admitted to hospital with high fever, flushing of the face, subcuticular mottling of the chest and abdomen, it is most difficult to make a diagnosis between incipient typhus and Pappataci fever, though to make such a diagnosis is of great practical importance. A great help is given by examining the blood: in Pappataci fever leucopænia is always present; in typhus, leucocytosis, or, at any rate, no leucopænia. When there is an epidemic of the two diseases and numerous patients are being admitted daily, there is no time to count the leucocytes with a hæmatometer. A rapid examination of a stained film, especially at the edges, generally enables the experienced observer to come to a conclusion at once, whether there is leucocytosis or leucopænia. I have found this procedure extremely useful in many a doubtful case.



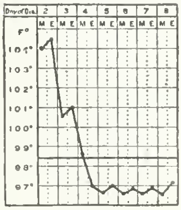
Pappataci fever.—Case 1.



Pappataci fever.—Case 2.



Pappataci fever.—Case 3.



Pappataci fever.—Case 4.

Dengue.

According to certain observers there have been quite a number of cases of dengue in Salonika, Gallipoli, and Macedonia. The cases which have been shown to me in Macedonia were all Pappataci fever, but there has been dengue in Gallipoli. Dengue cannot be distinguished from Pappataci fever the first two days, as the symptoms of the two diseases are identical, including the leucopænia. On the third day the fever generally drops in both maladies; but whereas in Pappataci fever the temperature often remains normal—though there are many exceptions—in dengue very often there is again slight fever, though not so high, on the fourth, fifth, and occasionally also on the sixth day, and the patient during those days again feels ill. Moreover, in dengue, when the temperature falls on the third day, the typical roseola or erythematous rash of dengue appears, during the crisis or shortly afterwards.

Though I have not myself seen dengue in the Balkans, I have seen almost innumerable cases of it in Ceylon and the Far East. I should like to call attention to one or two clinical points which have apparently been overlooked by some writers on the subject:—

(1) The condition of the superficial lymphatic glands.

(2) Relapses.

(3) Sequelæ.

Superficial Lymphatic Glands.—In most of the text-books I am acquainted with, it is always definitely stated that the lymphatic glands are never enlarged in dengue. In my experience, however, the enlargement of some lymphatic glands—cervical, axillary, &c.—is comparatively frequent, varying from 30 to 70 per cent. of the cases I have seen, and may be considered to be one of the common features of the disease. The glands most frequently affected are some of the cervical ones, then the axillary, inguinal, &c. The glands may occasionally be tender on pressure, and may remain enlarged for some days, at times weeks, after the fever is over. The gland juice, aspirated with a sterile syringe and injected in healthy individuals, will reproduce the disease (two positive cases out of three).

Relapses.—Relapses and reinfections are generally considered never to occur or at least to be extremely rare in dengue, but in my experience they are far from being so. I have known several individuals in Ceylon to get a typical dengue attack with rash, &c., in three successive years. A member of my own family had an attack of dengue in Colombo in November, 1913, another in February, 1914, and again in October of the same year. Every time the attack was typical, and the rash was present.

Sequelæ—I should like to say a few words on a sequela which is very distressing and very difficult to cure—polyarthritis, with swelling of various joints, either the small ones or the large ones, or both. The condition in certain cases, but for the fact that it develops after a typical attack of dengue, may be indistinguishable clinically from polyarthritis of rheumatic origin. Salicylates and iodides are useless, and the treatment is symptomatic; opiates have often to be used to calm the severe pains. This sequela in its severe type is, fortunately, comparatively rare, considering the very large number of cases of dengue occurring during an epidemic, but it is most distressing, being so little influenced by treatment. It may last from six to eight weeks, and sometimes much longer. A change of climate is often useful. In a milder form, pain in various joints, especially the small ones, with at times very slight swelling; this sequela is common, and may last for months after the attack of dengue.

(To be continued.)

◆

Goundou.—Botreau-Roussel (*Bulletin de la Société de Pathologie Exotique*, June). One hundred and seventeen cases were seen on the Ivory Coast, 108 times the nasal tumours were operated on, 107 cured, one died under chloroform. Of the nine not operated on, two refused operation, four were inoperable from the extent of involvement of the superior maxilla or from bad general health. Three had no paranasal tumours, but only diffuse periostitis of the face or inferior maxilla.

Those with paranasal periostitis also had other bones affected.

Tibia	58
Superior maxilla (excluding the nasal process)	14
Inferior maxilla	13
Bones of the forearm	4
Fibula	4
Humerus	2
Femur	2
Clavicle	2
Malar bone	1

The scapula, pelvic bones, ribs, and spinal column were never affected. The skull always seemed normal.

No patient gave a history of trouble inside the nose. Except one patient who had epistaxis for three hours at the commencement of an attack of yaws three months before the paranasal tumours, none had nasal discharge.

Most gave a definite history of a rash called Dobé lasting three months to a year. The first symptoms of goundou appeared in the last month of the rash, or within three months after.

Six patients stated their goundou began years after Dobé, either because the onset began slowly or started late.

Several patients with Dobé had, in fact, yaws; the progress, duration, and termination and results of treatment are the same; the discharges contain *Spirochæta pertenuis*. Two goundou cases inoculated with yaws developed no sign of yaws. Examination of lymphatic glands, often enlarged in goundou, was negative.

The patient who died under chloroform had, besides paranasal tumours, many bones affected; the tibiæ had marked anterior convexities. The compact tissue of the diaphysis was replaced by spongy tissue, and the medulla had large alveoli, containing red marrow. The fibula, ulna, and radius, the lower ends of the femur, and of the humerus were soon affected in the same way.

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THE JOURNAL OF

Tropical Medicine and Hygiene

August 1, 1917.

THERAPEUTICS OF SOAP.

A healthy body depends on a healthy skin, and a healthy skin depends on the use of suitable soap. In early times in cold climates, as in the Tropics at the present time, oils of various kinds were lightly smeared over the skin to render it soft and subtle, to remove dirt and accumulated epidermis. This is a long process, as the excess of oil has to be removed with water, or mild astringent acid is used. At a by no means distant time the hair was smeared with oil well rubbed into the scalp, then done over with cut apple (pomum)—hence the word "pomade." In the course of time apple was less used, and the words "pomade" and "pomatum" were restricted to the oily preparations used for the hair.

Soap is used to remove the results of the healthy action of the skin, the perspiration and accumulated scales. Soap, a combination of fat or oil with alkali, in contact with water, breaks up and forms an emulsion, so that both alkali and the oil unite with the so-called dirt containing extraneous matter.

To remove excess of scales as on corns, or dirt as after photographing, pumice stone may be used, by itself or combined with soap, then known as pumice soap, sand soap, or grit soap. Between the two extremes of sand soap and toilet soap there are many varieties of soap by which innumerable therapeutic effects can be produced, from improving the health of the skin to restoring it to a healthy condition.

In no branch of manufacture have there been more advances than in soap making, particularly in England, on account of the abundant supply of alkali, of pure fats, of vegetable oils of all varieties. Home manufacturers supplying all parts of the Empire have learned to suit their products to the most varied demands of climate, health and illness.

The amount of soap a nation uses is the measure of its health and prosperity. The amount exported indicates the extent of the health and prosperity it confers on others. In both respects England takes a prominent place, especially in medicated soaps, thanks to its trade in home-produced animal fats and to its import of tropical vegetable oils. The trade created by soap causes a continual stream of benefits to flow between all parts of the Empire.

Although dhobie itch and prickly heat are definite conditions, for the tinea of true dhobie itch is distinct and characteristic, yet many cases so called are simply due to irritation from perspiration and from other causes.

It is common knowledge that care of the skin is necessary for the boxer, the runner and rower, yet it is often forgotten that just as much care must be taken by everyone, especially in the Tropics, where skin conditions cause more discomfort, last longer, and heal less readily—scaly conditions, as psoriasis, excepted. A good soap is so made that the ingredients are in a state of extreme fineness. On contact with water the fat and alkali separate quickly, and an emulsion, the lather, is formed, that without waste combines with, softens, and removes the dirt.

Superfatted soaps, containing an excess of fat beyond the amount to saponify, are best for the toilet, and produce the soft skin so pleasing to the eye, so conducive to comfort and health. A supple skin does not crack. Fissures do not form in which germs can lodge. Some individuals who consider themselves in fair health find they cannot use soap for the face; in nearly every instance there is some —it may be slight—departure from health which, if attended to, allows a suitable soap to be used with marked advantage to personal appearance. The advantage of a suitable soap is especially appreciated in preventing irritable seborrhœic conditions, observed on return to Europe from the Tropics, a condition that occurs at home in spring before the thick winter underwear is replaced by summer clothes, and again later in the year when the weather is warm.

From the time when Naaman of old was cured by bathing in the naphtha-loaded water of Jordan, many various medicated baths have been used with marked benefit. The incorporation of drugs in soaps increases their action by the emulsoid condition in which they are applied. This is at once appreciated when a few drops of glycerine are poured on the hands as soon as a lather is formed, quite different from the effect of glycerine poured on the hand after drying on the towel. The advantage of soap before an operation is to soften the skin and remove germs. More strongly antiseptic soaps contain Benzoin, an extremely old favoured application to wounds in the form of Friar's Balsam, Tr. Benzoin Co., Borax, so favoured by genito-urinary surgeons, can be alternated with Soda Perborate, or combined with Camphor, the drug popularly favoured for chilblains and most useful for dysidrosis.

Shortly, medicated soaps contain (1) Antiseptics, Carbolic Acid, Corrosive Sublimate, Biniodide, Calomel and White Precipitate, Creolin, Eucalyptus, Formaldehyde, Iodoform, Lysol, Naphthol, and Terebene. (2) Sulphur, in the form of soap, does not cause dermatitis, frequently seen after using Sulphur Ointment.

This can be cured while Sulphur is still being applied by combining the drug in soaps containing, in addition, Ichthyol, Menthol and Eucalyptus, Resorcin alone or with Salicylic Acid, Naphthol and Nicotine. Soaps are by no means the least useful agents for the removal of scales, as in psoriasis. First there is soft soap (Sapo Mollis, B.P.), composed of Potash and Olive Oil containing free Glycerine; most useful for acne. For the hair it is mixed with an equal volume of Alcohol: Linimentum-Saponis Mollis, U.S.P., to be used as a shampoo, traditionally scented with 5 minims to the ounce of Oil of Lavender. Useful soaps are also made with Oil of Cade, White Birch-tar (Oleum Betulæ Alb.), Terebene and Thymol.

An especial favourite with chronic psoriatics is soap containing Sulphur, Camphor and Balsam Peru, which some find the best application for keeping their trouble in abeyance.

Acne is especially benefited by soaps with Sulphur or with Sulphur containing Ichthyol, alone or combined. A good combination is made with Lanolin (Adeps Lanæ Hyd., B.P.), 5 per cent.

Much benefit accrues from combining Sulphur with a differently acting antiseptic, like Menthol, Naphthol or Creolin.

Seborrhœa is largely prevented by soap which also aids, if it does not by itself cure.

A great advantage of the therapeutic use of soap is that the patient can vary the vigour and method of application. First, it may be rubbed in for as long as required, so as to produce a mild or strong effect. Secondly, the methods can be varied by allowing the lather to remain on for different periods of time; from a few minutes to aid the extraction of blackheads, to allowing it to dry on, as for the treatment of scabies.

By no means the least advantage of medicated soap is that when patients consider themselves sufficiently well not to require lotions and ointments, they will consent to use for a lengthy period a selected soap to complete the cure and prevent recurrence.

In conclusion, soap, besides being essential for the preservation of health, when medicated is an especially useful method of applying drugs for healing purposes.

Abstract.

ECHINOCOCCUS DISEASE.

By Lincoln Davis and Gerardo M. Baldoni, M.D,. Boston.

The disease is caused by a minute tapeworm, the *Tænia echinococcus*. This tapeworm exists in the intestine of the dog, cat, jackal, wolf, and perhaps in other carnivorous animals. The infected animal excretes in the fæces myriads of microscopic eggs of this worm, which are distributed over the grass and vegetation of fields and hillsides, and into the water of streams, lakes, ponds, and unprotected wells and reservoirs. Once the waters are infected with hydatid ova the disease may be distributed to a number of animals, and perhaps water fowl may play a not unimportant rôle in its spread. Dust storms may act as carriers. The eggs are light and are easily blown about in the dried mud of towns, which is constantly being pulverized.

Human beings, by drinking contaminated water, or by eating uncooked vegetables and roots, particularly watercress, dandelions and lettuce, may become infected. Infection may also take place by direct contact with infected dogs, as in handling or petting them. Wherever there is close association between man and dog, personal uncleanliness, and carelessness in handling food, there is most likelihood of infection. Domesticated and grazing animals, particularly sheep, cattle and swine, are commonly subject to hydatid disease in infected districts. Wild animals may also be infected; the disease having been reported in twenty-seven species of mammals. The dog, which harbours the parent parasite, the *T. echinococcus*, is not itself subject to the hydatid form of the disease, which is the larval stage in the life-cycle of the parasite, and occurs only in the intermediate hosts, such as the domestic animals and man, the result of ingestion of the eggs. If the dog is fed upon flesh or viscera containing hydatid cysts it develops in turn an adult tapeworm, and the cycle is completed. When the eggs of the *T. echinococcus* are swallowed by the intermediate host, the gastric or intestinal secretion attacks their outer shells, and the embryos are set free. By means of their six hooklets they burrow into the walls of the stomach or intestines, frequently penetrating the ramifications of the portal vein, and by it are carried to the liver, where they may be arrested in its capillary circulation.

It is in the liver that the great majority of hydatid cysts occur. The embryos may penetrate directly into the systemic circulation and reach the heart, and from there be carried to the lungs. If they succeed in passing through the capillaries of the lungs, reaching the general circulation, they may go wherever the blood-stream takes them, to form hydatid cysts in the kidney, brain, or muscles. It is possible that the embryo may reach the circulation through the lymphatic system; it may also directly penetrate into the peritoneal cavity. It is thought also that under certain conditions it may enter through the respiratory tract and develop in the lungs. Hutchins of Australia reports a case of a farmer who was bitten in the buttock by a cattle dog, and twenty years later developed an echinococcus cyst in that region. Prat of Uruguay reports a case of echinococcus cyst of the tongue. This appears to be the only case of the kind in the literature. These cases would seem to show that the part generally understood to be played by the digestive juice in liberating the ovum from its glutinous sheath is not absolutely necessary for its development.

The embryo having once reached its destination undergoes certain changes. The hooklets disappear, and the embryo is gradually converted into a small cyst, with two distinct layers containing a clear fluid. The cyst is enveloped in a fibrous covering, the result of reaction on the part of the neighbouring tissues. Buds develop from the parenchymatous layer of the parent cyst, from which daughter cysts develop. As the parent cyst grows it may become packed with innumerable daughter cysts, which in turn may give rise to granddaughter cysts. From the lining membranes of the cysts little bodies, armed with hooklets and known as scolices, are developed, which represent the heads of future tæniæ. If these scolices gain access to the intestinal tract of the dog they develop into adult worms.

The disease exists in two forms, the most common being the *Echinococcus unilocularis*, and the rarer form, *E. multilocularis* vel *alveolaris*. The *E. multilocularis* has never existed in Australia, either in man or beast. Of 214 cases in Iceland

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[1] Abstracted from the *Boston Medical and Surgical Journal*, May 24, 1917.

no case of the alveolar type was noted. Neither in the Argentine Republic, in a large series of cases, was a single case noted, nor in Uruguay in a series of 149 cases. Of the disease in North America, our of 241 cases only four were of this type. In none of our cases was the multilocular type noted.

The distribution of the *E. alveolaris* is peculiar, being almost exclusively restricted to two principal regions, one comprising Southern Germany, Switzerland, and the Austrian Alpine region, the other South-eastern Russia and Siberia. Some attempt to explain this distribution by reference to the fact that this form affects almost exclusively cattle, and very rarely sheep. In the districts in question, cattle raising rather than sheep raising, is the principal industry. Others consider it probable that the multilocular echinococcus does not represent a mere variety of the ordinary echinococcus, but a particular species with an, as yet, unknown tapeworm.

Hydatid cysts are of slow development, and may reach enormous size. One case was under observation for forty years. They have been reported as weighing over 30 lb. Death of the embryos may occur, with degeneration and calcification of the cyst. A fatal outcome may result from pressure of the cyst upon vital organs, or by encroaching upon and destroying the tissue of essential glands, the secretions of which are necessary to life. A serious consequence is infection, which may take place spontaneously, resulting in abscess formation, and occasionally pyæmia. The cyst may rupture into any neighbouring hollow organ, resulting in discharge of the smaller cysts into the stomach, intestine, bladder, or respiratory passages. They may rupture into the peritoneal cavity with dissemination of the growths. The cystic fluid contains a virulent toxic agent, which, when liberated into the tissues or peritoneal cavity, causes inflammatory reaction and marked constitutional disturbances, occasionally sudden anaphylactic shock and urticaria. The fatal result in Case 8 of our series may have been due to anaphylactic shock.

The bile passages and large venous trunks may be invaded, with serious results. Occasionally the cysts rupture externally and are discharged on the surface of the body.

Symptoms.—The symptoms of echinococcus disease are those of a slowly growing tumour, varying with the location of the growth, and are well exemplified by the appended case histories.

Diagnosis.—A slowly growing tumour, particularly one involving the liver, without cachexia, in a young adult who has lived in an infected district, is characteristic of the disease. Occasionally the so-called hydatid thrill, which is unmistakable and pathognomonic, may be elicited. It was obtained in two of our cases. The discharge of daughter cysts or microscopic heads or hooklets from the body cavities is, of course, positive evidence.

Laboratory Tests.—Memmi in 1901, studying the blood of six patients suffering from hydatid of the liver, noted an eosinophilia varying from 6 to 18 per cent.; others confirmed Memmi's findings, and it was thought that an increase of eosinophiles was pathognomonic of the disease. In some cases of the disease eosinophiles had been found as high as 68 per cent. It is claimed that an eosinophilia is more frequent in patients where the *Tænia echinococcus* is alive, and is absent where it is dead; also that it varies in the same individual without any apparent cause; that the eosinophiles increase after an exploratory puncture, operative interference, or spontaneous rupture of the cyst.

Zapelloni made an exhaustive study on the subject of the value of the various tests for echinococcus disease, eosinophilia, the precipitin test of Fleig-Lisbonne, and the complement-fixation test of Bordet-Gengou based on the Wassermann reaction, as first applied by A. Ghedini. They conclude that eosinophilia is present in about 60 per cent. of echinococcus cases, and when present is suggestive, but not confirmatory, of the disease. Eosinophilia is present in many other conditions. In our own series of cases eosinophilia was present in only one case (No. 26), in which there was 7 per cent. of eosinophiles. The precipitin test of Fleig-Lisbonne is generally conceded to be inconstant and of no great diagnostic value.

The complement-fixation test of Bordet-Gengou, based on the Wassermann reaction, is the most reliable test we have. This test was first applied by A. Ghedini in 1906, using as an antigen the cyst fluid obtained from an echinococcus cyst of the liver in a boy of 13. In 1909 he reported that the test had been found positive in forty out of forty-two cases of proved echinococcus disease. His findings have been confirmed by other investigators especially Zapelloni, who reported the test positive in 93 per cent. of cases.

In the last three years the echinococcus complemental test has been used at the Massachusetts General Hospital by Dr. J. Homer Wright. Ninety-seven tests in all have been made. Eighty-five were negative, twelve were positive, and seven proved to be echinococcus disease. One of the five other cases at operation showed an abscess in the abdominal wall, which upon microscopic examination showed no evidence of tuberculosis. Its appearance was not inconsistent with echinococcus cyst. One had clinically a large spleen and liver, a positive Wassermann reaction, and was not operated upon. Three were clinically syphilis, and had weak to strongly positive Wassermann reactions.

Among the eighty-five negative cases, twenty-four had a positive Wassermann reaction. The Wassermann reaction was negative in five of the proved echinococcus infections. It was not done in the remaining two.

There was some variation in the strength of the echinococcus reaction in the same patient from time to time. The cyst fluid proved a better antigen than the alcoholic extract of the cyst wall. The cyst fluid was found active as an antigen after more than eighteen months outside of the body.

Treatment.—The treatment of the disease is purely surgical. The use of salvarsan has been tested extensively with absolutely negative results. It occurred to us independently to make use of it in one case in which the complement-fixation test remained positive after operation; there was no apparent effect on the reaction. Tapping of cysts through the abdominal wall is to be condemned on account of the danger of leakage of fluid and daughter cysts into the peritoneal cavity, with dissemination of the disease. The tumour should be exposed by surgical incision, and a thorough exploration of the peritoneal cavity in abdominal cases for subsidiary cysts should precede the attack on the main cyst. After exposure and adequate walling-off, the cyst should be tapped and the fluid carefully withdrawn. The fibrous capsule should then be incised cautiously, whereby the inner cyst wall may often be separated from its outer sheath and drawn out entire. This is the ideal procedure. When this is not possible, on account of infection, adhesions, calcification, &c., as much of the inner cyst as may be is removed, and the cavity packed with gauze and allowed to granulate. Marsupialization is not often necessary with modern methods of walling-off, but is desirable in cases in which all the daughter cysts have not been removed at the primary operation. Of course it is most desirable to remove all of these whenever possible. In suppurative cases free drainage must be established. The results of the modern operation, in the absence of suppuration in the cyst itself, are extremely good.

Abstracts of Cases.

Case 1. *Echinococcus cyst of liver.*—J. P., male, aged 34. Born in England. Admitted August 6, 1875. Well up to five months ago, when he began to have pains in his stomach after meals. The pain was located on the right side over the ribs, and at this spot a tumour soon made its appearance. Jaundice and marked loss of flesh. On examination there was tenderness in the epigastrium and right hypochondrium, with an area of dullness extending from the costal margin to within 2 in. of the umbilicus.

Ten days after entrance it was noticed that there was a sudden decrease in the size of the tumour. A few days later he passed with the dejection a number of cystic bodies which were preserved for examination. On August 30 the tumour was aspirated and about 40 oz. of yellowish-brown fluid withdrawn, having a powerful fetor, the fluid containing bile, pus and albumin. Considerable pain and fever followed the aspiration. The swelling nearly wholly disappeared, leaving slight tenderness. Discharged relieved on September 9.

Case 2. *Echinococcus cyst of liver.*—C. H., sailor, aged 32. Had a large tumour in the right side of abdomen, extending from the costal margin to the crest of the ilium. The mass gave a sensation of fluctuation, but no thrill.

Operation.—Incision made in the flank over the tumour. Wall of the mass sutured to the parietal wound. An incision was then made through about one-quarter inch of normal liver substance into the cyst. A very large number of cysts and quantity of pus evacuated. Cavity packed with gauze. Patient discharged in excellent condition.

Case reported in the *Boston Medical and Surgical Journal*, April 28, 1892.

Case 3. *Echinococcus cyst of liver.*—Armenian. Gardener, aged 28, in U.S. seven years. Admitted September 6, 1898.

Operation September 13, 1898.

Previous history of malaria. Three years ago abdomen injured by a falling iron pipe. No subsequent symptoms except a slight swelling, which soon passed off.

Thirteen months ago first noticed the presence of a tumour in the right hypochondrium. This was at first the size of an egg, then gradually increased. Has lost 30 lb. in weight in six months.

Well developed and nourished man. In the right hypochondrium, extending from the costal margin above, to the level of the umbilicus below, there is a rounded swelling, flat to percussion, tense, non-fluctuant; no tenderness; smooth in contour. Heart pushed up; apex beat at fourth interspace.

White cells, 10,500.

Patient's evening temperature of 101° to 101·5° F.

Operation.—Cystic tumour connected with undersurface of the liver was exposed, tapped, and clear fluid withdrawn containing scolices characteristic of *Tænia echinococcus.* The cyst wall was then incised. Large cavity cleaned out with gauze. Portion of sac excised, edge of sac sutured to abdominal wall. Wound packed with gauze. Patient made a good recovery. Discharged relieved October 30, with a small sinus.

Case 4. *Echinococcus cyst of liver.*—R. G., Irishwoman, aged 31. Single.

Admitted to hospital November 15, 1898. Five years ago had tumour removed from liver. Well for three years; then pains returned in region of hypochondrium. Examination negative except for large liver.

Operation.—Cyst of liver tapped, peritoneum sutured to fibrous cyst wall; cyst then opened and inner sac removed.

Cavity packed with gauze. Convalescence slow. Considerable drainage.

Discharged relieved December 28, 1898.

Case 5. *Ruptured echinococcus cyst of liver.*—L. P., Russian, aged 19.

Brought in July 13, 1899, with a history of having been struck in the stomach and knocked down. Patient was shrieking with pain, vomiting large quantities of watermelon at intervals.

Marked emaciation. Abdomen very prominent, especially in upper half, which was distended and rigid. Evidence of free fluid in the abdomen. No definite tumour.

White count, 34,000.

Operation.—Incision through the right rectus. Large amount (estimated at three quarts) of bloody fluid escaped. A ruptured cyst was found the size of a football, lying free in the peritoneal cavity; exploring the liver there was found an opening on the upper surface of the middle of the right lobe, which led into a large cavity. This cavity was packed with gauze, and a portion of the sac was sutured to the abdominal wall. Considerable post-operative shock. Slow convalescence.

September 9, discharged with a discharging sinus.

October 21, 1899, re-admitted for discharging sinus. The sinus was opened up again, curetted, and cauterized.

Uneventful convalescence.

Case 6. *Echinococcus cysts of omentum and liver.*—S. K., Greek, aged 27, in U.S. seven years.

Admitted December 23, 1899. For a month has felt pain in the region of the liver and noticed a tumour which has been steadily enlarging. Unable to work for two weeks.

Examination showed considerable bulging of the lower ribs on the right side. The mass is dull on percussion, extends from the fourth costal space to the level of the umbilicus on right.

Operation.—January 6, 1900. Incision through right upper rectus; a cyst the size of a hen's egg removed from the omentum. Liver found much enlarged. Intestinal clamp placed on the portal vein and hepatic artery; incision made through anterior surface of the liver. A large cyst with thick, white wall opened, with escape of a large quantity of fluid. Sac of cyst removed intact. Another cyst, the size of a baseball, found at the upper portion of the liver; the sac of this was likewise removed. A fourth cyst, the size of a baseball, was found in the left lobe of the liver, which was not removed. Edges of liver wound sutured; clamps removed from portal vein and hepatic artery. Three rubber tubes placed in cavity of liver. Patient had some post-operative bronchitis; drained considerable bile and blood from the wound. On the seventh day of convalescence patient suddenly became markedly cyanotic and died very suddenly.

Autopsy.—Echinococcus cysts of liver, broncho-pneumonia, fibrino-purulent pleuritis, chronic perisplenitis. Hyperplasia of spleen, congestion of kidneys. Pathological report of specimen removed at operation—echinococcus cyst.

Case 7. *Echinococcus cysts of liver and lungs.*—S. S., No. 130122. K. S., Armenian. Labourer, aged 40. In U.S. six years.

Admitted December 13, 1902.

For the last ten weeks there has been progressive loss of strength and weight, accompanied by pain in the epigastric region. Two weeks ago stopped work. History of fever, but no chills.

A well-developed man, much emaciated and pale. Very slight jaundice.

No leucocytosis.

One-tenth of albumin in the urine.

The lower portion of the right chest bulging. There was flatness from the fourth rib in front to four fingers' breadth below the costal margin. Below the ribs there was a bulging tumour extending nearly to the median line.

Operation.—Incision over the tumour, which consisted of an enlarged liver. Aspirating needle found pus on the second attempt. An incision was then made through the liver substance, and pus, gelatinous material and cysts, estimated at four quarts in amount, evacuated. There was considerable hæmorrhage. Wound packed with gauze. Died on the fourth day after operation.

Autopsy No. 981 showed an evacuated echinococcus cyst of liver; small abscesses of liver, and echinococcus cysts of lungs.

Case reported in the *Boston Medical and Surgical Journal*, September 3, 1903.

Case 8. *Echinococcus cysts of peritoneal cavity and liver.*—Irishman, aged 52. Admitted January 29, 1904.

Six years ago, while in Havana, was seized with a severe pain in the right side, associated with cough. Was operated on later in New York.

Fairly well up to one and a half years ago, when he began to vomit. Noticed a lump in the abdomen, which has grown larger lately. Has felt weaker.

Well-developed and poorly nourished man. Liver dullness extends from the seventh rib to level of the umbilicus. Abdomen generally dull to percussion. Below the liver to the right of the umbilicus a hard, firm mass visible through the abdominal wall, about the size of an orange; non-fluctuant. Another one occupying the bladder region. In the left iliac region there is another indefinite mass. By rectum a large mass can be felt in the pelvis.

Hæmoglobin, 50 per cent.; white cells, 5,300; red cells, 3,888,000.

Operation.—Median laparotomy. Numerous cysts found, varying in size from a walnut to that of an orange; most of them were attached to the mesentery. Five of these were punctured and the lining membranes removed; two were removed entire. Patient's condition suddenly failed during operation and he died.

Case 9. *Echinococcus cyst of liver.*—Italian woman, aged 24. Admitted April 14, 1905.

History of pain in the right half of abdomen for one month; intermittent in character. No vomiting. Never jaundiced.

Examination.—Negative, except for a bulging mass below the costal margin on the right; firm, tender, moves with respiration.

Operation.—Tumour of the right lobe of the liver with intestinal adhesions. Tumour enucleated from the liver. Bleeding controlled by packing. Much post-operative pain; considerable drainage. Steady convalescence.

Discharged May 16, 1905.

Began work four months after operation.

Case 10. *Echinococcus cyst of liver.*—Swede, aged 49. Admitted August 24, 1906.

Five months ago jaundice, with clay-coloured stools. About the same time a small lump was noticed in the epigastrium. The lump has been enlarging lately. Never painful.

The tumour extends from the costal margin on the right to below the level of the umbilicus; dull on percussion; slight tenderness on pressure; suggests cysts on palpation.

Operation.—Large echinococcus cysts of the liver opened and drained. Condition of the patient did not permit of the removal of the lining membrane. Uneventful recovery.

June 29, 1907, re-entered hospital with a history that up to one month ago he had been well. Then began to have sharp pain in right side; jaundiced. Vomited for the last three days.

Marked jaundice. Definite tumour on the right side, extending about 3 in. below costal margin.

July 6, 1907. Operation, incision and drainage of echinococcus cyst of liver. Uneventful convalescence.

Case 11. *Echinococcus cysts of pleural cavity and peritoneum.*—Russian, aged 22. Admitted December 12, 1906.

In U.S. three and a half weeks. Was taken ill on steamer; ill ever since. Sole complaint is pain in the right side. One day feels pretty well, next day sick all over.

Signs of fluid in the right chest.

On December 13 chest tapped twice in the posterior axillary line, and about one pint of thin greenish fluid obtained. Abdomen flat, held rigid, tympanic throughout, no masses. Liver border 2 in. below costal margin. Hæmoglobin, 75 per cent.; white cells, 18,000.

Operation.—Resection of rib; pleural cavity opened, with the escape of cysts of all sizes. Cysts repeatedly discharged from wound during convalescence. Masses developed in the abdomen, one in the iliac fossa, another in the region of the bladder.

Operation January 19, 1907.

Pelvic cavity found full of cysts, which were adherent to the rectum, bladder, and intestines. Cysts freed and removed. Small incision made in the intestine and a mass of *Ascaris lumbricoides* removed. Intestinal wound sutured. Pelvis flushed out with corrosive sublimate 1-1,000, followed by salt solution. Abdominal wound closed without drainage. Good recovery. Purulent discharge with occasional cysts continues from the chest wound.

Operation (February 8).

Section 3 in. long of fifth, sixth, and seventh ribs removed. Cavity curetted. No further cysts found. Discharged March 6. Subsequent history unknown.

Case 12. *Echinococcus cysts of common bile duct and lesser peritoneal cavity.*—Italian, aged 28. Admitted to hospital March 22, 1907. During the last two years, and also eight months ago, had attacks similar to present illness; pain in right upper quadrant.

Jaundiced for eight days, tenderness and rigidity in region of gall-bladder.

Liver dullness extends from sixth space to 2 in. below costal margin; edge of liver distinctly felt.

Operation.—Cholecystectomy, for cholecystitis. During convalescence had an attack of pain in the region of wound, with some elevation of pulse and temperature. Discharged.

Re-admitted April 28, 1907, with temperature, pain, and chills. Marked tenderness over whole right side of abdomen.

Second operation, April 30. In the region of the common duct a cyst was found lying chiefly in the lesser peritoneal cavity. Cyst tapped, pus and bile drawn off. It was then freely incised with the escape of about 8 oz. of thick bile-stained fluid containing many small ruptured and unruptured cysts. Cavity irrigated, drainage tubes inserted. Uneventful convalescence. Reported to be in good health.

Case 13. *Echinococcus cyst of gastro-hepatic omentum.*—Greek, aged 23. Admitted July 15, 1907.

For eleven months has had considerable soreness in epigastrium. No vomiting or jaundice; has lost 17 lb. in weight.

Abdomen generally tympanitic, save over right hypochondrium, where there is slight dullness just below right costal margin. Heart and lungs, negative. Spleen and liver not palpable. Reflexes normal.

Hæmoglobin, 90 per cent.; white cells, 4,200. Stools negative.

Typical hydatid thrill was elicited over the gall-bladder region.

Operation.—Gall-bladder incision. Mass felt posterior to gastro-hepatic omentum, under the left lobe of the liver. Walling off gauzes placed; mass incised; a large hydatid cyst opened; large number of small cysts evacuated. One rubber tube and two gauze wicks placed in the large cavity. Slow convalescence. A subdiaphragmatic abscess was opened at the end of two weeks. Gradually improved. Jaundice which had been present cleared up. Patient was discharged on September 7, with small sinus, to the Convalescent Home. Subsequent history unknown.

Case 14. *Echinococcus cyst of liver.*—Greek pedlar, aged 35. Admitted July 19, 1907, with history of attacks of pain in the epigastrium, of indefinite character, for the last six months. Noticed no jaundice. For the last ten days pain has been more severe in right upper quadrant.

Abdomen rigid; some tenderness on pressure. Edge of liver two fingers' breadth below costal margin.

Operation.—Median laparotomy. Large echinococcus cyst of the left lobe of the liver disclosed; walling-off gauzes carefully placed; cyst incised, with the escape of one pint of fluid and many daughter cysts. Cyst cavity lightly curetted, wiped with gauze, and packed. Considerable post-operative shock and restlessness. Second day patient began to vomit; pulse poor; increasing abdominal distension. Gradually failed and died on the third day.

(*To be continued.*)

Original Communication.

NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.

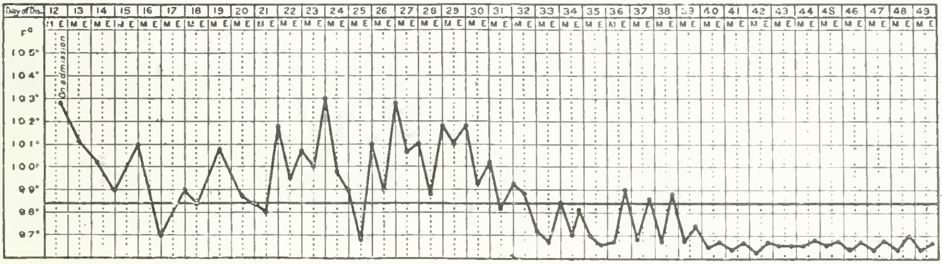
By Lieutenant-Colonel Aldo Castellani, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

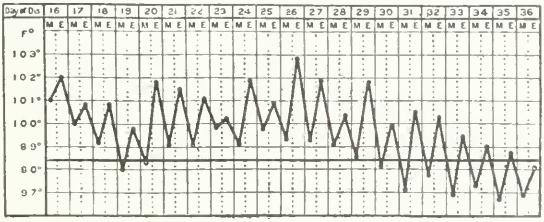
(*Continued from p.* 174.)

Enterica.

Enterica are frequent in the Balkans, but during the last eighteen months have not taken an epidemic course. Paratyphoid A and B are in certain districts more frequently met with than typhoid. Attention should be called to the occurrence of mixed infections, such as typhoid + paratyphoid B; or paratyphoid A + paratyphoid B. I have observed two cases of triple infection: typhoid + paratyphoid A + paratyphoid B; diagnosis based on hæmocultures. In regard to prophylaxis, the method of combined vaccinations (typhoid + paratyphoid A + paratyphoid B (T A B.); typhoid + paratyphoid A + paratyphoid B + cholera (T A B C), &c.) I devised many years ago, and used ever since, has given good results. The method has recently been adopted in all the Allied armies, thanks especially to the efforts of Dreyer, Walker, Gibson, Bassett-Smith, Rho, Conte, &c. The British and French Armies have adopted the trivaccine (T A B); the Serbian Army the tetravaccine (T A B C).



Case of mixed infection: Typhoid + Paratyphoid B.
(Case observed in the Balkans.)



Case of triple iofection Typhoid + Paratyphroid A + Paratyphoid B.
(Case observed in the Balkans.)

Enteric-like Fevers due to Intermediate and other Micro-organisms.

In the Balcanic and Adriatic Zones cases of fever resembling enteric, due to typhoid-similar, paratyphoid-similar, coli-similar germs, intermediate and other bacteria are not rare. These germs may be classified in the following groups:—

(1) Bacilli very similar to *B. typhosus* not clotting milk, not producing gas in any sugar; *B. lunavensis*, *B. pritnitzi*, *B. fæcalis alkaligenes*, &c.

(2) Micro-organisms culturally and biochemically identical with *B. paratyphosus* A, and *B. paratyphosus* B, but not influenced by sera derived from animals inoculated with the common, serologically typical strains of such germs. Before placing a germ in this group it is necessary to carry out the serological reactions after it has been subcultured a number of times. It must be remembered that occasionally one may come across germs with the cultural and biochemical characters of *B. paratyphosus* A or *B. paratyphosus* B, which, though inagglutinable at first, become agglutinable after a few transplantations.

(3) Do not coagulate milk, do not ferment lactose, but the reactions in certain other sugars—I use the term sugar *sensu lato*—differ from those found in the typical paratyphoid A and paratyphoid B bacilli.

TABLE SHOWING CULTURAL REACTIONS OF CERTAIN AEROBIC NON-SPORE PRODUCIN

Name of micro-organism	Motility	Gram	Gelatin	Serum	Litmus milk	Lactose	Saccharose	Dulcite	Mannite	Glucose	Maltose	Dextrin	Raffinose	Arabinose	Adonite
B. acidi lactici, Hüppe	O	O	O	O	AC	AG	O	O	AG	AG	AG	AG	AG	AG	A
B. aertryke, De Nobele	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	O	O	AGs	O
B. archibald	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	...	O	...	O
B. asiaticus, Cast.	O	O	O	O	A, Alk	O	AG	O	AG	AG	AG	AG	AG	AG	O
B. asiaticus mobilis, Cast.	+	O	O	O	A, Alk	O	AG	O	AG	AG	AG	AG	AG	AG	O
B. bentotensis, Cast.	+	O	O	O	A	A	A	As	O	A	A	O	As	O	O
B. capsulatus, Pfeiffer	O	O	O	O	AC	AG	AG	O	AG	AG	AO	AG	AG	AG	A
B. carolinus, Cast.	+	O	O	O	A, Alk	O	O	O	A or AG	A or AG	A or AG	...	AG	AG	...
B. cavicida, Brieger	+	O	O	O	AC	AG	O	AG	AG	AG	O	AG	AG	AG	O
B. ceylonensis A, Cast.	O	O	O	O	AC	O	O	O	O	A	O	O	O	O	O
B. ceylonensis B, Cast.	O	O	O	O	AC	A	A	A	A	A	A	A	A	A	O
B. cloacæ, Jordan	+	O	+	+	AC	AG	AG	O	AG	AG	AG	AG	AG	AG	O
B. coli Escherich	+	O	O	O	AC	AG	O	AG	AG	AG	AG	AG	AG	AG	O
B. coli-mutabilis, Massini	O	O	O	O	AC	AG	O	O	...	...	...	...	...	...	O
B. colotropicalis, Cast.	O	O	O	O	AC	AG	O	O	AG	AG	AG	AG	AG	AG	O
B. columbensis, Cast....	+	O	O	O	Avs, Alk, D or A	O or Gvs	O	AG	AG	AG	AG	As Gs	O	AG	O
B. coscoroba	O	O	O	O	AC	AG	AG	O	AG	AG	AG	AG	AG	AG	O
B. danysz	...	...	...	...	...	...	...	...	...	...	..	...	...	..	..
B. diffluens, Cast.	+	O	+	+	Alk, D	O	O	O	O or A	AG	O	O	O	O or Avs	O
B. dysenteriæ, Shiga-Kruse	O	O	O	O	A, Alk	O	O	O	O	A	O	O or As	O	O	..
B. dysenteriæ Flexner	O	O	O	O	A, Alk	O	O	O	A	A	A	A	A	A	O
B. dysenteriæ, Hiss and Russell ...	O	O	O	O	A, Alk	O	O	O	A	A	O	A	A	A	O
B. dysenteriæ, Strong	O	O	O	O	AC	O	A	A	A	A	A	O	A	A	O
B. entericus, Cast.	O	O	O	O	O	AG	O	AG	AG	AG	AG	AGs	OD	AG	O
B. enteritidis, Gaertner	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	AG	O	AG	O
B. fæcalis alkaligenes, Petrushky ...	+	O	O	O	Alk	O	O	O	O	O	O	O	O	O	O
B. gasoformans nonliquefaciens ...	O	O	O	...	AC	AG	AG	O	...	...	...	...	...	...	A
B. gintotensis, Cast.	O	O	O	O	D, AC	O	O	O	O	A	O	O	O	A	O
B. giumai, Cast.	O	O	O	O	A, Alks	A	O	O	O	AG	AG	AGs	O	AG	O
B. grunthali, Cast.	+	O	O	O	AC	AG	O	O	A G	AG	...	AG	AG	AG	O

Abbreviations used in the table.—A = acid ; G = gas ; C = clot ; D = decolorized ; Alk = alkaline ; s = slight ; A, Alk = acid, th
nor gas in sugar media, non-production of indol, non-liquefaction of gelatin or seru

inal Bacilli, with Names arranged in Alphabetical Order.

Sorbite	Galactose	Lævulose	Inosite	Salicin	Amygdalin	Isodulcite	Erythrite	Glycerine	Indol	Voges-Prosk.	Broth	Remarks
AG	AG	AG	O	O	...	...	O	...	+	O	Gt	Belongs to capsulated bacilli; differs from *C. lactis aerogenes* in not fermenting inosite; differs from *B. coli-tropicalis* in being capsulated and in fermenting adonite and not fermenting salicin
AG	AG	AG	AG	O	O	AG	O	A	O or + s	O	Gt	Identical culturally and serologically with *B. suipestifer*; identical culturally with *B. enteritidis*, Gaertner (differentiation by agglutination tests), and *B. paratyphosus* B (differentiation by Castellani's absorption test, agglutination not sufficient)
...	AG	...	...	...	...	...	...	...	+	+	Gt	
AG	AG	AG	O	O	O	AG	O	AG	+ s	O	Gt	
AG	AG	AG	O	O	O	AG	O	AG	+ s	O	Gt	Differs from *B. asiaticus* only in being motile
O	A	A	A	As	O	O	O	A	+	O	Gt	
AG	AG	AG	AG	...	...	...	...	...	±	+	Gt	Capsulated, generally considered to be identical with *B. lactis aerogenes*
A	AG	AG	...	...	...	...	..	...	+	O	Gt or + P	
...	AG	AG	O	A	...	...	...	...	+	O	...	Brieger described it at first as non-motile; differs from *B. coli* in not fermenting maltose
O	O	O	O	O	O	O	O	O	O	O	Gt	
A	A	A	O	O	O	A	O	A	+	O	Gt	
AG	AG	AG	A or O	O	...	...	O	...	+	+	Gt	Liquefaction of gelatine very slow. The more important intestinal liquefying bacilli may be grouped as follows: (1) lactose fermenters (*B. cloacæ*); (2) lactose non-fermenters, Gram + (*B. proteus vulgaris*); (3) lactose not fermenters, Gram O (*B. diffluens*)
AG	AG	AG	O	AG	O	AG	O	AG	+	O	Gt	
...	...	...	...	...	...	...	...	...	O	...	...	Incompletely described; late lactose fermenter (after six days); said not to produce indol
AG	AG	AG	O	AG	O	AG	O	AG	+	...	...	Differs from *B. coli* in being non-motile and in non-fermenting dulcite; from *B. neapolitanus* in not fermenting saccharose and dulcite
AG	AG	AG	O	AG	O	AG	O	AG	+	O	Gt	
AG	AG	...	A	...	...	...	...	...	O	...	...	Differs from *B. coli-tropicalis* in fermenting saccharose. Certain AA. use the term *B. coscoroba* to indicate a different germ, with all the characters of the fowl cholera bacillus (pasteurella)
...	...	...	...	..	..	...	...	...	...	...	...	Culturally and serologically identical with *B. enteritidis* Gaertner (Bainbridge)
...	AG	A or AG	...	O	...	...	...	A	O	...	Gt	See remarks on *B. cloacæ*. Some strains clot and peptonize milk
O	A	A	...	O	..	...	As	...	O	...	...	
O	A	A	...	O	O	O	O	O	+	...	...	
O	A	A	...	O	O	O	O	O	+ or ±	...	...	
A	A	A	...	O	O	A	O	O	+	...	...	
AG	AG	AG	...	...	...	...	...	...	+	O	Gt, Ps	
G	AG	AG	O	O	O	...	...	O	O	...	Gt	Identical culturally with *B. suipestifer* (= *B. aertryke*) and *B. paratyphosus* B; differs serologically
O	O	O	O	O	O	O	O	O	O	O	Gt	The typical *B. fæcalis alkaligenes* produces strong alkalinity in all sugar broths, but certain strains are said to produce slight acidity in glucose and maltose. Some strains peptonize milk
...	...	...	A	...	...	...	...	...	O	+	...	Incompletely described. It is probably very similar [to *B. colotropicalis*, but indol O
O	A	O	O	O	O	O	O	O	O	O	GtP	
G	AG	AG	O	AG	O	AG	O	AS	+	O	Gt	
G	AG	AG	O	...	...	...	O	...	+	O	Gt	

ie; Gt = general turbidity; P = pellicle; vs = very slight; O = negative result, viz., neither acid nor clot in milk, neither acid
case may be. + = positive result; ± = sometimes positive, sometimes negative.

TABLE SHOWING CULTURAL REACTIONS OF CERTAIN AEROBIC NON-SPORE PRODUCIN

Name of micro-organism	Motility	Gram	Gelatin	Serum	Litmus milk	Lactose	Saccharose	Dulcite	Mannite	Glucose	Maltose	Dextrin	Raffinose	Arabinose	Adonite
B. icteroides, Sanarelli	+	O	O	O	A, Alk	O	O	A or AG	AG	AG	AG	AG	O or A	A or AG	..
B. kandiensis, Cast.	+	O	O	O	As,D,Alk	O	As	O	A	A	O	O	O	O	A
B. khartoumensis, Chalmers and Macdonald	O	O	O	O	A	AG	O	AG	AG	AG	AG	O	O	AG	...
B. lactis aerogenes, Escherich	O	O	O	O	AC	AG	AG	O	AG	AG	AG	AG	AG	AG	AG
B. levans, Wolffin	+	O	+	...	AC	AG	O	O	AG	AG	..	AG	AG	AG	O
B. lunavensis, Cast.	O	O	O	O	As, Alk	O	A	O	O	A	A	A	O	A	O
B. madampensis, Cast.	O	O	O	O	AC	A	A	O	A	A	A	A	AS	A	O
B. morgan	O	O	O	O	O, Alk or As, Alk	O	O	O	O	AG	O or A	O or A	O	O or A	O
B. metadiffluens, Cast.	+	O	+	+	Alk	O	O	O	O	O	O	O	O	O or As	O
B. neapolitanus, Emmerich	O	O	O	O	AC	AG	AG	AG	AG	AG	AG	AG	AG	AG	O
B. negombensis, Cast.	O	O	O	O	O, Alk	O	O	O	O	A	O	O	O	O	O
B. oxytocus perniciosus, Wyssokowitsch	O	O	O	O	AC	AG	AG	AG	AG	AG	..	AG	AG	AG	AG
B. paracolon, Day	+	O	O	O	A, Alk	O	O	A	AG	AG	AG	AG	AG	AG	...
B. paraentericus, Cast.	+	O	O	O	A	AG	AG	AG	AG	AG	AG	AGs	AG	AG	O
B. paraaertryke, Cast.	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	O	O	AG	O
B. paratyphosus A, Schotmüller ...	+	O	O	O	A	O	O	AG	AG	AG	AG	AG	O	AG	O
B. paratyphosus B, Schotmüller ...	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	AG	O	AG	O
B. paradiffluens, Cast.	+	O	+	+	Alk, D or P	O	AG	O	O or A	AG	O	O	O	O	O
B. paradysentericus, Cast.	O	O	O	O	A	O	O	O	O	O or A	O	O	O	O	O
B. pneumoniæ, Friedländer	O	O	O	O	AC	A	AG	AG	AG	AG	AG	AG	AG	AG	AG
B. pritnitzi, Cast.	+	O	O	O	A	O	O	O	O	A	A	A	O	O	O
B. proteus vulgaris, Hauser	+	+	+	+	C or P	O	AG	O	O	AG	AG	O	O	O	O
B. pseudo-asiaticus, Cast.	O	O	O	O	A, Alk	O	AG	AGs	AG	AG	AG	AG	AG	AG	O
B. pseudo-coli, Cast.	+	O	C	O	AC	AG	AG	AG	AG	AG	AG	AGs	AG	AG	O
B. psittacosis, Nocard	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	AG	AG	AG	O
B. pyogenes fœtidus, Passet	+	O	O	O	AC	A	A	A	A	A	A	A	A	A	...
B. Schæfferi, von Freudenreich ...	O	O	O	...	AC	AG	O	AG	...	...	...	...	...	...	O
B. suipestifer, Kruse	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	O	O	AGs	O
B. talavensis, Cast.	+	O	O	O	Alk, D	O	A	O	O	A	O	O	O	O	O
B. tangallensis, Cast.	O	O	O	O	As, Alk	O	A	A	A	A	A	A	A	A	O
B. typhi murium, Loeffler	+	O	O	O	A, Alk	O	O	AG	AG	AG	AG	AG	O	AG	O
B. typhosus, Eberth	+	O	O	O	A	O	O	O	A	A	A	A	As	O	O
B. vekanda, Cast.	+	O	O	O	A	AG	O	AG	AG	AG	AG	O	O	AG	A
B. veboda, Cast.	+	O	O	O	A, Alk	O	O	AG	A	AG	AG	AG	AG	AG	O
B. vesiculosus, Henrici	O	O	O	O	AC	AG	O	O	...	...	...	...	...	...	O
B. Watareka, Cast.	+	O	O	O	A	O	O	AG	AG	AG	AG	O	AG	AG	O
B. Werahensis, Cast.	+	O	O	O	A	O	O	AG	A	A	AG	AG	AG	AG	...
B. Wesenberg	+	...	O	O	A	A	AG	A	A	AG	...	...	..	...	...
B. Willegodai, Cast.	+	O	O	O	A, Alk	O	O	A	A	AG	AG	AG	AG	AG	O
B. Wolinæ, Cast.	+	O	O	O	A or A, Alk	O	A, or Alk	O	AG	AG	AG	O	O	O	O

Abbreviations used in the table.—A = acid ; G = gas ; C = clot ; D = decolorized ; Alk = alkaline ; s = slight ; A, Alk = acid, th
nor clot in milk, neither acid nor gas in sugar media, non-production of indol, non liquefaction of gelatin or seru

tinal Bacilli, with Names arranged in Alphabetical Order (*continued*).

Sorbite	Galactose	Lævulose	Inosite	Salicin	Amygdalin	Isodulcite	Erythrite	Glycerine	Indol	Voges-Prosk	Broth	Remarks
AG	AG	AG	...	..	...	...	...	...	±	O	Gt or GtP	Considered to be identical with *B. suipestifer*, but complete serological tests have not been carried out
O	A	A	A	O	O	A	A	A	O	O	Gt	
AG	AG	AG	O	AG	O	...	...	AG	+	O	...	
AG	AG	AG	AG	AG	...	...	...	...	O	+	Gt	Differs from *B. acidi lactici* in fermenting inosite
AG	AG	AG	O	AG	...	...	O	...	O	+	...	
O	A	A	O	O	O	O	O	Avs	+	O	Gt	
A	A	A	O	O	O	A	O	A	+	O	Gt	
O	A or AGs	A or AGs	O	O	O	O	O	O	+ +	O	Gt	
AG	O or As AG	O AG	O	O AGs	O	AGs	O	AGs	+	O	...	Differs from *B. coli* in being non-motile and in fermenting saccharose; from *B. pseudocoli* in being non-motile; from *B. colotropicalis* in fermenting dulcite and saccharose
O	A	AS	O	O	O	O	O	O	O	O	Gt	
AG	AG	AG	AG	AG	O	AG	O	AG	+	+	...	
AG	AG	AG	...	...	...	...	...	...	+	O	Gt	
AG	AG	AG	...	...	...	...	...	..	+	O	Gt, Ps	
AG	AG	AG	AG	O	O	AG	O	AG	O	O	Gt	
AG	AG	AG	O	O	O	AG	O	O or As	O	O	Gt	
AG	AG	AG	AG	O	O	AG	O	O	O	O	Gt	Certain strains, serologically typical, may produce at times only A instead of AG; some strains do not ferment inosite (Weiss and Rice)
...	AG	AG	...	O	...	...	...	O	O		Gt.	
	O or As	O	O	O	O	O	O	O	O		Gt.	
AG	AG	AG	AG	AG	...	...	O	...	O	O	...	
O	A	A	O	A	O	O	O	O	O	...	Gt	
O	AG	A or AG	O	O	...	...	...	O or As	+	...	Gt	Cultures emit a disagreeable odour. Hauser distinguished at first three varieties of proteus: *P. vulgaris* (rapid liquefaction of gelatine), *P. mirabilis* (slow liquefaction), *P. Zenkeri* (no liquefaction); later abandoned this differentiation
AG	AG	AG	O	AG	O	AG	O	AG	+	O	Gt	Differs from *B. asiaticus* in fermenting dulcite
AG	AG	AG	O	AG	O	AG	O	AGs	+	O	Gt, Ps	Differs from *B. coli* in fermenting saccharose, belonging to the group *communior* of coliform bacilli
AG	AG	AG	...	O	...	...	...	...	O	O	Gt	Identical with *B. aertryke*, according to Bainbridge
...	A	A	...	...	...	...	...	...	+	O	Gt	
O	...	...	O	...	..	...	...	...	+	O	Gt	Incompletely described
AG	AG	AG	O or AG	O	O	AG	O	As	+s	O	Gt	Identical culturally and serologically with *B. aertryke*. Other synonyms for *B. suipestifer* are *B. choleræ suis*, *B. of hog-cholera*, Salmon and T. Smith (1885)
O	A	A	A	A	O	O	O	A	+	O	Gt	
A	A	A	O	A	O	A	O	A	+	O	Gt	
AG	AG	AG	...	O	O	...	.	O	O	O	Gt	Bainbridge has found out that the name is applied to different organisms, some strains being serologically identical with *B. aertryke*, others with *B. enteritidis*, Gaertner, others with *B. paratyphosus* B.
A	A	A	O	O	O	O	O	As	O	O	Gt	Certain strains, milk A, Alk.
AG	AG	AG	O	O	O	AG	O	AG	O	...	Gt	
AG	AG	AG	AG	O	O	A	O	O	O	...	Gt	
...	...	...	O	...	...	...	...	...	+	O	...	
AG	AG	AG	AG	O	O	AG	O	A	+	...	Gt	
...	O	O	...	A	O	AG	...	O	+s	...	Gt	
...	...	...	...	...	...	...	...	...	+	..	Gt	
...	AG	A	...	AG	O	AG	...	O	+s	...	Gt	
O	A or AG	O	O	O	...	...	...	A	O	...	Gt	

ne; Gt = general turbidity; P = peptonised (milk), pellicle (broth); vs = very slight; O = negative result, viz., neither acid
e case may be. + = positive result; ± = sometimes positive, sometimes negative.

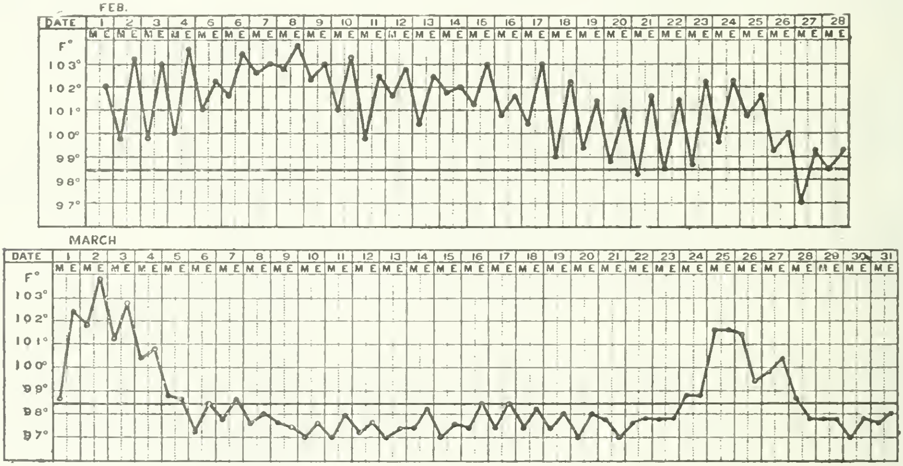
(4) Do not coagulate milk, but ferment lactose.

(5) Coagulate milk; do not ferment lactose.

(6) Coagulate milk and ferment lactose, but differ from *B. coli communis* by certain reactions in other sugars.

The mere presence of one of the above organisms in the blood is not sufficient to enable one to state that the fever is due to that germ. Repeated examinations may show that it is present in association with the true typhoid, or paratyphoid A or paratyphoid B bacilli, and may have little or no part in the causation of the symptoms.

Occasionally, for instance, in true typhoid, hæmocultures may show presence of streptococci, staphylococci, and coli-like and intermediate germs, probably entering the general circulation through the intestinal ulcers. There cannot be any doubt, however, that in certain cases intermediate germs are the real cause of the fever; in such cases the germs are generally found in the blood as well as the stools, and the blood contains specific agglutinins, which slowly disappear after the fever is over, while all examinations for typhoid, paratyphoid A and paratyphoid B remain constantly negative.



A case of triple infection : Typhoid + Paratyphoid A + Paratyphoid B.
(Ceylon case.)

I have collected in the following table a certain number of organisms belonging to the groups I have mentioned, as well as certain other intestinal aerobic bacteria. The table will probably be found useful in the determination of intestinal bacteria; it should always be remembered, however, to supplement, whenever possible, the biochemical reactions with serological tests. It should be remembered also that while the biochemical reactions of certain bacteria (for instance, *B. typhosus*) are practically constant, those of some other germs may vary to a certain extent.

FEBRIS COLUMBENSIS.

This fever is due to *Bacillus columbensis*. It was first described by me some years ago in Colombo, and cases have been reported from the Balkans by Lurie and myself; Conte has seen a case in Naples. There are two types of this disease: one is typhoid-like, the other Malta fever-like, with several relapses. The organism which causes it is interesting owing to the instability of its action on lactose; the same strain may at times have no action whatever on this sugar; at other times it produces gas. Milk is not coagulated. Serologically, it differs from paratyphoid A, paratyphoid B, and from all strains of *B. coli*, *B. coli-tropicalis*, &c.

For further details on this fever and its causative agent the reader may consult the fairly recent papers of Spaar (JOURNAL OF TROPICAL MEDICINE AND HYGIENE, December 15, 1915), and Lurie (*Lancet*, February 12, 1916, p. 350).

MALTA FEVER.

Malta fever does not seem to be very frequent in the interior. I have seen two cases in Macedonia. It is much more frequently met with on the coast and in the islands of the Adriatic and Ægean Seas.

KALA-AZAR.

Kala-azar of adults I have never seen in the Balkans; kala-azar in children I have often seen in islands of the Adriatic. I have seen a case also in Macedonia.

Tartar emetic, which was first introduced in the treatment of kala-azar by myself in the Tropics, and Caronia and Cristina in Europe, gives good results. For details of the treatment the reader is referred to my last paper on the subject in the *British Medical Journal*, October 21, 1916.

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THE JOURNAL OF

Tropical Medicine and Hygiene

August 15, 1917.

TROPICAL MEDICINE AND HYGIENE.

The article with this title by Sir Patrick Manson in a recent number of the *British Medical Journal* is of entrancing interest to all living in or having any connection with the Tropics. To-day everyone in every part of the world depends on the Tropics for some of his food supply.

Everything written by the father of tropical medicine should be read in full, especially by the profession at home. The reader cannot fail to be impressed by the benefits conferred on humanity by the suppression of malaria and trypanosomiasis, leishmaniasis, yaws, and leprosy. No one can fail to appreciate the patient labour devoted to accumulate knowledge step by step, here a little and there a little, to aid in treating and preventing diseases of the Tropics and the spread of epidemics in Europe.

Sir Patrick Manson also summarizes the advances made in the knowledge of tick and pappataci fevers by work done from the Congo to the Zambesi, from the Sudan to Ceylon. He explains how new knowledge has lessened and, still more in the future, will lessen the effects of worms, how round worms may be abolished, how schistosomiasis, the scourge of Egypt and other parts of Africa, may be lessened, if not prevented; how Guinea worm, another of the supposed plagues of Egypt, may be eradicated.

The way mosquitoes cause malaria and yellow dengue, and how these diseases can be prevented, is so clearly stated, that it is hard to imagine why ever the most bigoted of lay administrators fail to co-operate with medical officers to advance measures for the furtherance of tropical hygiene, which, in addition to saving many lives, increases the financial prosperity of the lands entrusted to their care.

To take only one subject, the prevention of trypanosomiasis (sleeping sickness). But little study is required to appreciate the work, and make others anxious to emulate the example of the Portuguese in Principe.[1]

R. McCarrison gives a brief account of the contributions of India to the advancement of medical science. There are one thousand British doctors in a land of over 300 million people!—in a land where plague, pestilence, and famine are the crude problems of everyday life. Twenty-eight and a half millions receive the benefits of Western medical and surgical treatment in a single year. No less than 1,050,000 of India's people received the benefits of surgical treatment in the same time. It is the home of plague, cholera, and sudden death, where striking additions have been made to forensic medicine, where vast work has been accomplished to prevent and cure both cholera as well as plague.

Would that there was at the India Office a statesman as farseeing as the late Mr. Joseph Chamberlain, who did so much when at the Colonial Office!

What has been left undone is shown by the Mesopotamia Report, and will be left undone until the official mind has a true mental grasp of facts, and is able to foresee difficulties and to meet emergencies as well as to forestall them.

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[1] "Sleeping Sickness: A Record of Four Years War against it in Principe, Portuguese West Africa, by the Portuguese Medical Mission." Translated by Lieutenant Colonel J. A. Wyllie.

Perhaps some of the defects of the Indian Medical Service are due to home control; be that so or not, above all is the need for the weight of medical opinion to press on the official mind the need of tropical hygiene and sanitation. Doctors can only point out the needs of the nations, the methods to meet those needs. They can supervise their administration, but cannot compel their being started or carried through. What, above all, is necessary is for experienced Indian medical officers to occupy positions, especially at home, where they can bring to bear their knowledge and experience on the highest lay administrators, to be in a position to compel them to listen to advice, to insist on their taking responsibility.

The very old saying that legislators disregard minute things is as true as ever. So that their disregard of protozoa, the primitive forms of life and worms, upon which almost without exception tropical diseases depend, is not to be wondered at. When it comes to hydrophobia, due to an ultramicroscopical organism, one Indian institute treats as many cases as there are in the rest of the world put together.

Though it is plain to everyone that much has been accomplished by tropical medicine, much yet remains to be done. As to tropical hygiene, it is still in its first infancy; so that there is work to do, and though it does not fall to the lot of everyone to attain the triumphs of Sir Patrick Manson, yet there is the due reward of fame for each.

Flight of Mosquitoes (J. A. A. Le Prince and T. H. D. Griffiths, *U.S. Public Health Reports*, May 4).—Anopheles were stained in nets by spraying with a 1 per cent. aqueous solution of eosin from an atomizer. Their flight extended approximately a mile from a breeding place, producing very profusely. Beyond this distance stained specimens were not found. The distance of flight from a place producing very freely, but less profusely, was decidedly less—approximately a half-mile. Stained specimens of *A. quadrimaculatus* were taken as follows: Two at 3,245 ft., three at 3,090 ft., one at 2,800 ft. In one test they flew across a river 800 ft. wide in returning to a plantation, from which they were originally caught

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LONDON SCHOOL OF TROPICAL MEDICINE.

EXAMINATION RESULTS. FIFTY-FOURTH SESSION.

JULY, 1917.

THE following candidates passed the examination of the above School (May-July, 1917): M. Erfan (Distinction), P. M. Antia, P. A. Dingle, S. Dolmer (Miss), R. R. Syquia.

Abstract.

ECHINOCOCCUS DISEASE.

By LINCOLN DAVIS and GERARDO M. BALDONI, M.D., Boston.

(*Continued from p. 180.*)

CASE 15. *Echinococcus cyst of liver.* Icelander, aged 33. In U.S. seventeen years. Admitted to hospital March 17, 1908. For three years attacks of pain in right hypochondrium, with chills, nausea, and vomiting. Attacks come suddenly, recurring every three to five weeks. Has had some pain in the lower abdomen. For the last four weeks attacks of pain have been worse, with chills, fever and sweating.

Small, poorly developed and nourished woman. Tenderness, rigidity and spasm in right hypochondrium; slight tenderness in right lower quadrant. Liver felt 2 in. below costal margin.

Operation (March 25, 1908). Exploratory laparotomy. Adhesions about the gall-bladder. Gall-bladder itself not involved. Large echinococcus cyst of the liver found above the gall-bladder. Cyst opened and cavity curetted; edge of sac sutured to the peritoneum. Cyst cavity swabbed out with Harrington's solution and packed with gauze. Patient ran a septic temperature.

Secondary operation April 8. Previous incision opened, another cyst removed from the lower surface of the liver, and an abscess of the liver substance incised and drained. Patient ran an irregular temperature, with occasional chills.

X-ray of chest negative.

May 11, third operation. Incision reopened; no more cysts found. Old abscess reopened and a few ounces of thin grumous pus removed; drained with tube and gauze. After a few days chills recurred, with temperature. Considerable discharge from wound.

June 20, fourth operation. Liver explored. A number of soft spots on the surface of the liver found, which on puncturing emitted small amounts of pus. Drainage.

Patient put on vaccine treatment with some improvement. July 30, discharged unrelieved.

CASE 16. *Echinococcus cyst of liver.*—Italian, aged 20. Two years in U.S. Admitted June 15, 1908. For about one month has noticed a swelling in the right hypochondrium, which is painful and prevents working. Swelling came on suddenly. Never jaundiced.

Abdomen presents a smooth, rounded swelling in the right upper quadrant, causing a bulging of the lower ribs. Tumour is tense, not tender; descends with respiration. Liver dullness extends to within 1 in. of umbilicus.

Operation.—Echinococcus cyst on the anterior portion of the liver disclosed, tapped, incised and marsupialized. Clear fluid escaped with one daughter cyst. Convalescence uneventful.

Patient had more or less pain following the operation for seven months; vomited frequently, unable to work. Re-entered hospital and remained ten days; the symptoms quietened down without further operation.

Six years later in excellent health.

Case 17. *Echinococus cyst of liver.*—Greek, aged 32. Admitted May 26, 1909.

One year ago attack of severe abdominal pain; had to give up work. A week later another attack of pain. Since then has had numerous attacks lasting about one hour; relieved by heat. No connection with meals. Vomited twice, jaundiced for two months. Last attack of pain, two days ago, required morphia.

Prominence in epigastrium over left costal edge, where there is an excoriation of the skin. Spleen palpable. Liver dullness extends from fourth rib to 2 in. below costal margin. Tender area in middle of epigastrium. No shifting dullness.

Hæmoglobin, 80 per cent.; white count, 11,800; differential count not remarkable.

Operation.—Cholecystostomy with removal of small cyst from gall-bladder, no stones. Liver seemed enlarged, with white spots on it. Convalescence uneventful.

Examination of cyst suggested echinococcus disease.

Re-admitted into the hospital with history of chill three days ago, pain in chest, profuse sweating and fever.

White count, 18,300.

Abdomen soft to pressure, tympanitic. Liver edge not felt.

Operation.—Exploratory laparotomy; nothing found. Patient failed rapidly and died.

Autopsy showed echinococcus infection of liver; abscess of liver; fibrino-purulent peritonitis.

Case 18. *Retroperitoneal echinococcus cyst.*—German woman, aged 48, married. Admitted November 26, 1909. No previous illness except stomach trouble. Noticed lumps in both breasts, May, 1909, about size of hen's eggs. No pain or tenderness.

In the abdomen there is an indefinite tumour extending from the costal margin to 1½ in. below umbilicus on the right side; smooth contour; no tenderness. Cystoscopy and catheterization of ureters negative.

White count, 11,400.

Operation.—December 13; laparotomy. Large retroperitoneal tumour exposed. This was opened with the escape of a great number of small echinococcus cysts, and a large amount of thick, yellowish, custard-like material. Sac well dissected out from the surrounding tissues and removed entire; wound closed without drainage. At the same sitting the left breast was amputated for cystic disease.

Reported January 10, 1911. Felt well. Gained 30 lb.

Case 19. *Echinococcus cyst of left kidney.*—Italian, aged 23, single. Admitted March 23, 1914.

As a boy in Italy had a dog that he played with and often slept with.

Two years ago passed a small colourless, bean-like body in his urine; no pain or blood. Five months later he passed several more similar masses, and since then has passed many such bodies. Lately has had more or less pain in lower half of abdomen, but has kept on with his work. A cyst passed three weeks ago was submitted to microscopic examination, and showed a thin laminated membrane containing clear fluid.

Spleen non-palpable. Liver not enlarged. No extraneous masses. Collargol injection of kidney pelvis normal.

Renal Function.—Appearance time thirteen minutes; 38 per cent. in one hour.

Echinococcus fixation test positive.

Operation, nephrectomy. Specimen consisted of an enlarged kidney, and at one end a cyst the size of a small tangerine orange. On section, the kidney substance was almost entirely replaced with numerous small thin-walled cysts containing scolices of the echinococcus. Many of these cysts lay free in the kidney pelvis and upper part of the ureter. Convalescence uneventful.

April 22, complement fixation test negative.

Patient well and working.

Case 20. *Echinococcus cyst of kidney.*—H. P., female, aged 35. Greek. In U.S. seven years. Admitted July 24, 1914.

Fifteen years ago had an attack of pain in the upper left quadrant and noticed a small tumour at the same time, which has been slowly increasing in size. During the last two months pain in the left side has increased in intensity. Pain radiates to the pubic region and to the thigh. Vomiting the last two weeks. No jaundice. General weakness.

There is a large mass in the abdomen filling the whole left side. It extends from under the costal margin on the left to a point midway between the pubes and umbilicus. No edge or notch felt.

Hæmoglobin, 90 per cent.; reds, 4,900,000; whites, 13,000. Mononuclears, 78 per cent.; basophiles, 20 per cent.; eosinophiles, 2 per cent.

Renal function normal. X-ray negative. Wassermann negative.

Operation.—Exploration showed tumour to be retroperitoneal and connected with the kidney. Incision closed. Incision made in flank. Large echinococcus cyst attached to kidney ruptured with escape of large amount of fluid and many cysts. Nephrectomy. Uneventful convalescence.

Echinococcus Fixation Test.—Positive.

Case 21. *Echinococcus cysts of liver and right kidney.*—Italian labourer, aged 34, married. Fourteen months in U.S. Admitted September 12, 1914.

About a month ago was taken with sudden severe abdominal pain which compelled him to quit work. Pain localized in the upper quadrant. Since the first attack has never been free from pain, but not sick enough to be in bed; some fever, digestion disturbed. Severe attack of pain in the upper right section of the abdomen on the day of entrance, with a temperature of 102° F. Bile in urine.

Pre-operative Diagnosis.—Acute cholecystitis or high appendix.

Operation.—Gall-bladder, duodenum and stomach not remarkable. Inflammatory mass felt in region of the right kidney. Abdominal incision closed.

Lumbar incision made, kidney a mere shell containing a large quantity of thin fluid and many cysts of all sizes. Incision enlarged, cavity explored with hand, and found to lead up to the liver. Cavity irrigated, drained with gauze and tubes. Uneventful convalescence.

Wassermann test negative.

Echinococcus complement fixation test positive.

October 13, salvarsan 0·3 given.

Complement fixation test remains positive after salvarsan.

Present condition, good; working.

Case 22. *Retroperitoneal echinococcus cyst.*—Italian, male, aged 44. Admitted February 27, 1915.

For four months has noticed a lump in the right lower quadrant. No pain. Some backache.

Examination.—In the right lower quadrant of the abdomen is a large, hard mass filling the whole quadrant. Typical hydatid thrill elicited by heavy percussion over the tumour. X-ray, negative. First complement fixation test negative. White count, 10,800.

Operation.—Incision through the border of the rectus. Large retroperitoneal tumour extending from under the ribs down to the pelvis and to the median line. An attempt was made to shell out the tumour; found to be impossible. Walling-off gauze placed and echinococcus cyst opened. Large number of daughter cysts evacuated. Cavity extended under ribs in the region of the right kidney. Kidney could not be made out. A large portion of the anterior wall of the cyst was excised, its edges sutured to the peritoneum, and the cavity packed with gauze.

Convalescence uneventful except for considerable post-operative temperature. Wound gradually closed.

Pathological report of specimen, echinococcus cyst.

Complement fixation test April 2, strongly positive.

Present condition, good; patient working.

Case 23. *Echinococcus cyst of liver.*—J. E., Syrian, aged 34. Admitted October 20, 1915.

One year ago had an attack of severe intermittent epigastric pain radiating to lumbar region. Attacks lasted for about an hour, and came every few hours for about two weeks. Feels nauseated, but does not vomit. Pain has no relation to eating. Two days ago had an attack lasting one hour. Has never noticed any jaundice up to now.

Liver dullness extends from fifth rib to 5 cm. below costal margin; edge felt. Spleen palpable. Moderate jaundice.

Echinococcus fixation test weakly positive.

Blood: 6,320,000 reds, 6,700 whites. Differential count not significant. Coagulation time of blood, five minutes.

X-ray shows no evidence of gall-stones, but a process involving the pylorus suggestive of malignant disease or specific.

October 25, 1915, operation.

Pre-operative diagnosis, echinococcus cyst.

On the under surface of the liver there was a tumour, giving the characteristic thrill. Incision enlarged by a lateral cross-cut; walling-off gauze placed and cyst punctured, with the escape of a few daughter cysts. Cyst wall removed with forceps, leaving a cavity about the size of an apple. Tube drainage through stab-wound in flank. Considerable drainage containing bile-stained fluid.

November 20 discharged in good condition, with small sinus in the side.

November 9, the echinococcus test was still strongly positive. Present condition good.

Case 24. *Echinococcus cyst of liver.*—Italian female, married, aged 44. Admitted October 14, 1915.

Always well up to present illness. One year ago had severe pain in epigastrium, lasting several days. This pain radiated to the right shoulder. Six months ago had similar pain, and again eight days ago. During each attack patient vomited and had fever. For the past eight days has had pain every day; daily vomiting; jaundiced.

White count, 14,600. Differential count: polynuclears, 77 per cent.; small lymphocytes, 5 per cent.; large lymphocytes, 13 per cent.; mast cells, 5 per cent.

Well-developed and nourished. Eyes jaundiced. Abdominal examination shows extreme tenderness along costal border, otherwise negative. Patient had considerable pain the day after admission, requiring morphia.

Operation.—Gall-bladder found distended. There was an irregular, cystic mass occupying much of the liver substance. This was opened with the liberation of multitudes of small and large cysts, from the size of a pea to a golf ball. Foul-smelling, greenish material was evacuated from a deeper cyst. Cavity wiped clean; as much as possible of the lining removed; cavity packed with gauze. Gall-bladder rapidly removed. Considerable post-operative shock. Indirect transfusion for shock. Patient gradually failed and died on second day.

Pathological report of cyst removed; echinococcus cyst.

Autopsy showed evacuated echinococcus cyst of liver. Examination of removed gall-bladder showed nothing remarkable.

Case 25. *Echinococcus cysts of the liver and peritoneal cavity.*—Greek, aged 22. Admitted March 6, 1914.

As a child had attacks of pain in side, accompanied by fever. Seven years ago had pains in lower abdomen, lasting a week. Felt a lump in this region, which later disappeared. Two years ago had a similar attack and another lump in same area. Four and a half months ago had headache and noticed that he was yellow. Felt feverish. Nauseated at times. Felt fullness in epigastrium, and noticed a lump in this region. Jaundice lasted one month. Worked until two weeks ago, when he gave up on account of left-sided pain.

Well-developed and nourished man. Mass felt in region of right kidney. Mass felt by rectum above prostate.

Pre-operative diagnosis: Hydatid tumour of liver.

Operation.—Oblique incision from median line to lower rib margin, incising outer half of rectus muscle. A large cyst found involving right lobe of liver. Cyst also felt in pelvis, and left lobe of liver. Walling-off gauzes placed, cyst in right lobe opened, many small cysts evacuated. Sac marsupialized; packed with gauze.

March 29, secondary laparotomy, with removal of echinococcus cysts of sigmoid, rectum, gastro-hepatic omentum and great omentum. A large cyst in the left lobe of the liver and in the region of the spleen not touched. Wound closed without drainage. Good convalescence.

Discharged with old wound still draining. No subsequent note.

Case 26. *Echinococcus cyst of the brain.*—Italian labourer, aged 24. In U.S. two years.

Positive findings: Subjective, gradual loss of power of right arm for two months, loss of power of right leg for one month, paræsthesia of right side of body and extremities, aphasia for past five days.

Objective: Optic fundus; disc margin obliterated, disc region pale, lamina cribrosa and optic cup obscure, veins engorged and tortuous. Pupils unequal, right greater than left, both react to light and accommodation. Eyes slightly prominent. Definite right homonymous hæmianopsia. Weakness of right facial muscles. Deep reflexes increased on right motor aphasia complete. Memory evidently markedly disturbed; he seems disoriented. Disposition very irritable when aroused. No dizziness or vertigo. Ataxia in both legs; right foot not brought up well from floor.

Differential count: Polymorphous neutrophiles, 74 per cent.; eosinophiles, 7 per cent.; small mononuclear, 10 per cent; large mononuclear, 9 per cent.

Wassermann: Spinal fluid and blood tests negative. Lumbar puncture, 3 c.c. clear fluid; no increase in pressure; count, nine cells per cubic mm. Globulin negative.

X-ray of skull, negative.

December 4, 1913.—Exploration from presumed tumour of left hemisphere. Surface normal. Aspiration of brain, evacuation of clear cystic fluid. Brain incised; three parasitic cysts found and removed from left temporal lobe.

December 10, 1913.—Removal of bone flap size of a pigeon egg; great cerebral tension.

February 12, 1914.—Aspiration of cyst in left hemisphere; 38 c.c. fluid removed.

March 3, April 29, and May 18, 1914.—Explorations with removal of more fluid each time. Died June 14, 1914.

Echinococcus complement-fixation test, March 13, 1914, positive.

Autopsy: Echinococcus cyst of heart and pericardium, including auricular walls; cystic formation of the lumbar cord; bronchopneumonia; chronic otitis media.

Case 27. *Echinococcus cyst of liver.*—Italian, aged 49, married. In U.S. eight years.

Pneumonia eleven years ago; for the past eleven years has had periodic attacks of acute pain in gall-bladder region, at times accompanied by vomiting and jaundice.

Three days ago had acute pain in gall-bladder region, which lasted two days, and was accompanied by vomiting.

Well-developed and fairly nourished; abdomen showed a slight prominence at the gall-bladder region, which on palpation appeared to be a smooth, round, tender mass of about the size of an adult male fist. Otherwise the examination was negative.

Operation November 20, 1913. A cyst the size of a baseball, with a thickened capsule, was found springing from the inferior surface of the liver, mainly from the quadrate lobe. The encroachment of the cyst upon the gall-bladder and its ducts had probably caused the symptoms simulating gall-bladder disease. A needle was plunged into the cyst, and a clear, watery fluid aspirated. The diagnosis of hydatid disease was made, and later confirmed in the pathological findings. The cyst, along with the edge of the liver, which had been practically separated from the greater mass of the organ by the cyst, was removed *en masse*. Bleeding was controlled by catgut sutures going through the full breadth of the liver substance, and by warm salt solution. Considerable gastro-hepatic fold, to which the cyst was adherent, had to be detached, causing a mechanical gastroptosis. This was remedied by suturing it back into place. Beneath the cyst, within the liver substance, was a cavity the size of a lime, which contained a necrotic membranous substance and a turbid serous fluid. This was thought to be a disintegrated hydatid cyst which had been dead and inactive for many years. The cavity was thoroughly swabbed, and the site of operation drained with rubber tubing. Outside of an unretentive stomach for the first three or four days, the patient made uninterrupted recovery, and on the twenty-seventh day was discharged in good condition, only requiring a protective dressing.

January 5 healed. Patient in excellent condition.

Case 28. *Echinococcus cyst of liver and omentum, and ruptured echinococcus cyst of lung.*—C. G., male, aged 27. Italian. In U.S. fifteen years. Admitted August 23, 1912, but refused to remain longer than one week.

In 1910 had a severe attack of pain in the epigastric region, centred at the ensiform. At this time first noticed a small swelling just below the ensiform. From then on had similar attacks at irregular periods, depending on food taken, and accompanied by nausea and occasional vomiting. After two years the swelling had increased perceptibly, and a feeling of fullness in the epigastric region, and shortness of breath on exertion developed.

Well developed and nourished; abdomen showed a prominence just below the ensiform, which moved with the liver on respiration. On palpation it was a smooth, doughy and tender mass, intimately connected with the liver. Liver dullness extended three fingers below the costal margin on the right side, and four fingers below the same margin on the left side, hinting towards the fact that the mass sprang mostly from the left lobe of that organ. The right side of the chest was dull from the inferior angle of the scapula down, and an occasional distant dry crackle was heard.

X-ray negative. Wassermann test negative.

Blood: 5,200 white corpuscles; hæmoglobin, 80 per cent.; coagulation time, seven minutes. Stained specimen: polynuclears, 46 per cent.; lymphocytes, 51 per cent.; eosinophiles, 1 per cent.; transitional, 2 per cent.

Diagnosis of echinococcus disease of the liver was made and operation suggested.

Operation January 22, 1915. On opening the peritoneum, a huge cyst was seen to spring from the entire inferior surface of the liver. It was adherent to the stomach, omentum, transverse colon, kidneys and spleen, and the gall-bladder could not be located at all. A series of four exogenous cysts, ranging in size from a hen's egg to a walnut, had thoroughly freed themselves from the original cyst and were adherent to the omentum. Three other exogenous cysts were adherent to the original cyst itself. These were carefully freed and individually removed *en masse*. Most all contained living scolices. The left lobe of the liver had most all been destroyed, the cyst filling its space. The wound drained profusely a sero-mucous fluid mixed with bile.

January 26 and February 10, echinococcus fixation test strongly positive. Patient was discharged in good condition on February 13. The sinus on the right seemed to communicate with the chest cavity, for when the patient coughed there was an expulsion of air through the sinus. During the rest of February and March the patient had a dry cough and vesperal fever. Sputum was negative for tuberculosis. Examination showed consolidation of the middle and inferior lobes. Patient expectorated large quantities of mucus, some brick red, other prune-juice appearance. Examination of it showed hooklets of disintegrated scolices, and diagnosis of hydatid cyst of the lung made. Cough and expectoration decreased and disappeared in June. The sinus was completely healed in May. The patient felt fine.

Echinococcus fixation test December 7, 1915, negative.

Patient well and working at present.

Case 29. *Echinococcus cyst of liver.*—Albanian, male, aged 28, comber in worsted mill. In U.S. three years. Admitted September 5, 1916; discharged October 11, 1916.

Since boyhood employed on a farm as herder of sheep and cattle. Four years ago suffered from a slight pain in right lower chest when lying on that side. This lasted about one year. About one and a half years ago had attacks of pain about every two weeks in right hypochondrium after hard work. Pain lasted five to ten minutes; relieved by rest.

Above condition continued until five months ago, when attacks came every two or three days, lasting two to fifteen minutes. About same time swelling in right hypochondrium was noticed. Was then as large as now. Pain not severe, relieved by rest, but sharply localized and interferes with work. Has no relation to meals, and stays in same spot.

Well-developed and nourished. Heart and lungs normal. Mass in right upper quadrant, extending to level of umbilicus. Edge rounded, smooth and deep in abdominal cavity. Moves freely with respiration. No spasm, tenderness or other masses. Liver dullness from fourth space to 13 cm. below costal margin in right mammillary line. Edge palpable, surface firm and has several large rounded nodules, only slightly tender to palpation. Spleen and kidney not felt.

Blood: September 6, white count, 5,000; hæmoglobin, 80 per cent. Smears September 5 and 9 show neutrophiles, 62 and 58 per cent.; small lymphocytes, 25 and 39 per cent.; large lymphocytes, 10 and 9 per cent.; mast cells, 2 per cent.; transitionals, 1 per cent.; eosinophiles, 2 per cent.; reds and platelets, o.k.; slight achromia. September 7, Wassermann and echinococcus fixation tests negative.

X-ray No. 27640: Gall-bladder negative. Outline of left kidney distinctly seen, right not made out. Diaphragm high on right with limited downward excursion. Shadow of liver large, edge not distinct, marked tenderness over liver.

Diagnosis: Echinococcus cyst of liver.

Operation.—September 12. Epigastric incision through right rectus muscle exposed large right hypochondrial fluctuant retroperitoneal tumour size of football, with sharp thin liver edge moving up and down over upper portion with each respiration. Rest of abdominal organs normal. Tumour tapped, one gallon of clear, colourless fluid removed. No daughter cysts. Cyst opened and explored, no contents found save a thick, whitish, translucent lining membrane with characteristic laminated structure of its outer layer. This removed with no resistance. The fibrous capsule of the cyst then cut down until normal kidney reached, proving cyst to be of upper pole of right kidney. Kidney apparently all right. Wicks into kidney and peritoneal cavity at gall-bladder region.

Pathological report, September 12: Echinococcus of kidney. Blood: September 13, white count, 5,800; September 22, 17,200; September 28, 9,200; September 19, echinococcus fixation test negative.

Convalescence uneventful except for elevation of temperature without apparent cause.

Discharged relieved on October 11, 1916.

Original Communications.

"SCARLET FEVER-LIKE ERUPTIONS" IN THE TROPICS.

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Contents.—*Introductory—Erythema Scarlatiniforme—Dermatitis Scarlatiniformis—Scarlet Fever in the Tropics—Ætiology—Diagnosis—Summary—Acknowledgments—References.*

Introductory.—Everyone practising in the Tropics is well acquainted with the various erythemata of a more or less transitory nature met with in malarial and dengue fevers and in persons taking quinine and usually called "*Erythema scarlatiniforme*," though the two former are generally mere blushes, while the latter is usually more truly scarlatiniform in that it has the minute red points of a scarlet fever rash. In our opinion only eruptions showing these punctations are worthy of the term Erythema scarlatiniforme. This eruption is often classified with many other quite dissimilar affections under the general heading "*Erythema hyperæmicum.*" In our opinion two distinctly separate conditions are confused under the term Erythema scarlatiniforme, viz., a hyperæmia and an inflammation.

The hyperæmia should, in our opinion, be regarded as the Erythema scarlatiniforme, and is clinically recognized by being, usually, of short duration, and not followed by marked desquamation, and is therefore usually easily differentiated from scarlet fever even when symptoms, such as sore throat, slight pains in the joints, &c., may be present.

The inflammation, on the other hand, is much more severe, consisting of not merely a marked and extensive scarlet fever-like rash, followed by prolonged and extensive desquamation, but also at times by throat and other symptoms. Unna reports that a few cases of the "Recidivans" type of this inflammation have been examined histologically, when it was found that in the hyperæmic stage the *Stratum granulosum* was absent, but that the cells of the rete Malpighii had proliferated, and so had caused an elongation of the papillæ, in which not merely were the vessels dilated, but an infiltration of embryonic cells was present. In the desquamative stage the *Stratum granulosum* was not merely present, but was also thickened, while the cells of the *Stratum corneum* were nucleated. This type, for which the term *Dermatitis scarlatiniformis*, in our opinion, should be used and reserved, is difficult to differentiate from scarlet fever. It presents itself in two forms, viz., as *Dermatitis scarlatiniformis* and as *Dermatitis scarlatiniformis recidivans*, or, in other words, in a non-recurrent and in a recurrent form.

Although we may distinguish clinically and pathologically between *Erythema scarlatiniforme* and *Dermatitis scarlatiniformis*, still they are probably often brought about by the same cause, viz., some chemical agent, as will be indicated below, after the brief descriptions of the cases which we have met with.

Erythema Scarlatiniforme.—Passing over the transient erythematous eruptions commonly seen in dengue and malarial fevers, and which cannot possibly be mistaken for scarlet fever, we will consider cases which more closely resemble this disease and which lead to difficulties in diagnosis.

A European official in the Anglo-Egyptian Sudan felt unwell and out of sorts on the first day of the illness, and next day he noticed that he had a sore throat and took 10 gr. of quinine. This was the only time on which this drug was administered during this illness, although the patient had often taken it previously without ill-effects. As he was travelling he simply gargled his throat with permanganate of potash, and kept his bowels slightly moved by means of magnesium sulphate, as there was a distinct tendency to constipation.

On the fifth day of his illness the tonsillar symptoms were severe, both sides being swollen, but the left side exhibited a dark greyish slough about the middle, while white spots could be seen on the left faucial pillar. There was slight bleeding when an attempt was made to remove the slough. The lymphatic glands at the angle of the jaw and in the upper part of the neck were swollen and tender. The patient could only swallow liquids, and the taking of these was by no means an unmixed pleasure. The tongue was covered with a whitish fur in the centre, though the tip and sides were clean. The bowels were distinctly constipated, notwithstanding the salts. There was no nausea or vomiting, and the urine was typical febrile urine, and never contained albumen. He probably suffered from fever from the first day of the illness, as on the fifth day the temperature ran from 102° to 104·4° F., on the sixth day it ranged from 101·6° to 103·2° F., on the seventh day it varied from 99·8° to 100·4° F., while on the eighth day it was virtually normal, never rising higher than 98·8° F., and after that it ceased to rise. The pulse varied in rate directly with the temperature, and was slightly dicrotic when this was high. The blood-pressure was low, and the respiration varied directly with the temperature.

On the evening of the fifth day there might have been a slight blush on the legs, though it was scarcely noticeable, but on the sixth day there was a typical scarlatiniform eruption consisting of minute bright red points, generally situate on a paler but still red background, though in some regions this background looked quite pale. The points were not appreciably raised above the surface and could be easily obliterated by light pressure, leaving for a very brief period a whitish spot where this pressure was applied. It was best developed upon the lower part of the abdomen and the inner aspects of the thighs, but it was quite well marked on the arms, legs, neck, chest and back, and it showed the patchy distribution so often mentioned in scarlet fever. There was no flushing of the palms and soles, and the backs of the feet and hands were not attacked. When the rash was fully developed he was given salicylate of soda in 5-gr. doses three times a day, but it neither increased the rash, nor did it seem to delay its disappearance.

The conjunctivæ were slightly injected and uncomfortable, and there was some epiphora, especially on the left side. The forehead was quite clear, but the eyelids and cheeks showed a diffuse reddish blush which, however, was not prominent.

There was no circumoral pallor. There were no other symptoms except some slight pains in the knee-joints, which cracked audibly on being moved, but they quickly disappeared, and were possibly attributable to the gout from which the patient had suffered for years.

There was no headache or mental disturbance, and the patient could and did read during the whole illness.

It will be observed that with the full development of the rash the temperature fell rapidly in one night from 103·2° F. on the seventh day to 99·8° F. on the morning of the eighth day, even though the patient at that time was still constipated. The rash faded rapidly during the eighth and ninth days, and was not followed by desquamation or discoloration, but there was a curious irritable condition of the skin, producing a *cutis anserina*, which persisted for about a day in certain regions, and was particularly marked on the back and thighs.

On the ninth day of the illness the patient was convalescent but felt weak, and the remains of the swollen lymph glands could still be felt in the neck, while the tongue, which had cleaned from front to back on the eighth day, but had remained bright red, assumed its normal hue. It never showed a white or red strawberry appearance. The illness was considered to have ended with the evening of this day.

With regard to other matters, it may be mentioned that the patient had suffered from typical scarlet fever some twenty-one years previously while in Europe, and that a Gram-negative-Gram-positive diplococcus forming chains was obtained from the inflamed left tonsil, but this was not obtained in pure culture, probably owing to its weakened condition due to the consistent antiseptic gargling, which was begun very early in the illness.

Attention is particularly invited to the following points:—

(1) The eruption appeared on the sixth day, while the tonsils were probably responsible for the initial illness on the first day.

(2) The rash coincided with the loosening of the dark greyish tonsillar slough at its edges.

(3) The absence of headache and vomiting, of the typical scarlet fever tongue, of the circumoral pallor, and of the desquamation.

(4) The presence of a peculiar organism on the tonsil.

Dermatitis scarlatiniformis.—The cases of the eruption which we have observed are divisible into two groups, i.e., those associated with an organism resembling that mentioned above as being found on the tonsil of the case of Erythema scarlatiniforme, and one associated with the administration of a salt of quinine.

Group A.—These are the cases in which we found in the throat a Gram-negative-Gram-positive organism, similar to, if not identical with, that mentioned above. We are unable to give as full an account of these cases as in the above as we were not in charge of them, and only saw them by the kind permission of their medical attendants, to whom we are duly grateful. We will therefore confine ourselves solely to what we consider to be the salient features of these cases.

They both occurred in Khartoum, but they had no evident association with one another; the attacks took place months apart; their social positions and work were so different that it is to be doubted whether they ever came into, even accidental, contact with one another at any time. Both cases had resided long enough in Khartoum to exclude the chance of either having brought the infection from the outside.

In neither instance did the disease spread to the persons in contact with them, and during the year which has elapsed since the last case occurred no others have been reported.

One case began before the cool weather set in, and the other occurred after it had ended.

They both began with rather severe attacks of tonsillitis associated with a membranous-like film fever, which, however, only lasted a few days, and some enlargement of the glands in the neck in one case.

On or about the sixth to ninth day of the illness a typical scarlet fever-like eruption suddenly appeared all over the body, being most marked upon the trunk and limbs, and much less so on the face.

Notwithstanding the general resemblance to scarlet fever there were some points of difference; for example, the tongue never showed the typical "strawberry-like" type, the rash appeared longer than forty-eight hours after the first sign of sore throat, there was no vomiting, but one of the cases had diarrhœa, which, however, only lasted during one day and was quite mild, and no albumen was found in the urine at any stage of the illness.

The rash gradually faded, but as this occurred it was accompanied and followed by a most extensive desquamation, during which large flakes came off the hands and feet. This desquamation lasted about three or more weeks, and during this period, and as soon as the throat symptoms had subsided, the patients felt much easier, and were, comparatively speaking, well.

There were no complications, sequelæ, or relapses.

Captain Archibald, D.S.O., R.A.M.C., very kindly informs us that he saw an apparently similar case some years ago in a British officer residing in the

British barracks at Khartoum. This case, though closely resembling scarlet fever, showed points of difference, which made him very doubtful as to this being the true diagnosis.

In both the two cases which we saw Gram-negative-Gram-positive diplococcal-like organisms, capable of growing into long chains, were found in the exudate on the tonsils.

In our opinion these organisms belong neither to the genus *Diplococcus* Weichselbaum 1886 emendavit Winslow and Rogers 1905 nor to the genus *Streptococcus* Rosenbach 1884 emendavit Winslow and Rogers, but to a separate group of organisms at present not defined, but with which should be incorporated the coccus known at present by the name *Diplococcus crassus* von Lingelsheim 1906. from which, however, they differ in several particulars (*vide* references, Chalmers and O'Farrell).

As we intend to deal with these peculiar cocci in a future communication, we merely indicate that they were present in both cases.

One contact showed the same organism on the tonsil, but, being treated at once, showed neither tonsillitis nor any eruption.

Months after the attack one patient was found to be carrying the germ on the tonsil.

The points which we desire to emphasize are:—

(1) The great general similarity of this complaint to scarlet fever, though several typical symptoms were missing.

(2) The length of time between the onset of the inflammation of the throat and the appearance of the rash.

With regard to this last point we are in full agreement with Ker, who states:—

"The rash of scarlatina makes its first appearance about twenty-four hours from the onset of the disease. When it is delayed longer than forty-eight hours, we may reasonably believe that the original sore throat was due to some other cause than scarlatinal infection."

And we go further, and say that when days intervene between a severe tonsillar infection and the appearance of the rash, we may reasonably believe that the eruption is due to some other cause than scarlatinal infection.

Group B.—In this group we include those cases of *Dermatitis scarlatiniformis* which are obviously of chemical origin, and we take as an example the following case:—

An English lady, who had been resident for a number of years in the Tropics, was known to be extremely susceptible to quinine in any form, as the administration of this drug, even in very small doses, was followed by slight fever and a scarlet fever-like eruption. This lady was advised to take a tonic wine which was thought at the time not to contain quinine. She quite willingly took this wine after inquiring about the quinine, but in about forty-eight hours her temperature suddenly rose to a maximum of 101° F., and an erythematous eruption closely resembling that of scarlet fever appeared on the face, trunk and limbs, and was accompanied by itching and a certain amount of swelling on the face which made it somewhat resemble an erysipelatous rash on that site, but not on the trunk or limbs.

It seemed as though the rash had spread into the mouth as the tongue was markedly red, while the fauces were red, congested and slightly painful.

On the second day of the illness the temperature was found to be normal and did not again rise, and except for a slight sense of itching in the parts covered by the eruption the patient was quite well. She ate and slept well, there was no headache, no gastric or intestinal disturbance. Her urine was normal and never at any time contained albumen. The rash gradually faded during some seven days, and was followed by a most extensive desquamation, which, however, ceased in some seven days after its commencement.

On inquiry the manufacturers very kindly informed us that the wine did contain a small quantity of quinine, and as the illness closely resembled that produced by a small dose of the same drug it was attributed to this cause. We believe that in this case the whole illness was an *anaphylactic phenomenon*, and that the rise of temperature agreed with the slight fever noted by Chalmers and Martyn twice in their case of acnitis, and which they explained by a reference to Friedburger's experiments, which show that the rise or fall of the temperature in anaphylactic experiments depends upon the dose of the anaphylactogen, which, if small, is associated with a rise and, if large, with a fall.

Scarlet Fever in the Tropics.—After more than twenty years' residence in the tropical regions of Africa and Asia one of us has only once seen a case of true scarlet fever, and even this was an imported case which, being carefully isolated, did not spread. We have, however, heard of a small epidemic among children occurring as the result of the introduction of an imported case into a tropical town.

This experience agrees with that of Sir Leonard Rogers in India, who in 1910 stated that scarlet fever was very rarely met with in that country, and that when it did occur it was an imported infection of a mild nature, which showed no tendency to spread widely. He quoted Gibson as reporting thirteen cases in the children of a British regiment, and as stating that in these cases the typical rash appeared on the second day of the illness, and was associated with the strawberry tongue, inflammation of the tonsils, pharynx and salivary gland, and with albuminuria and dropsy in six cases.

He quoted other cases similar to the above, all of which were very definite instances of the disease being imported into India by trooping ships.

He also stated that the disease appeared to be equally rare in China and other tropical regions, and that some of the outbreaks appeared to have been due to infection from clothes sent through the post from infected houses in England.

There is, therefore, no doubt that the occurrence of scarlet fever must be considered as a possibility in the Tropics, but the diagnosis must depend upon the presence of certain important signs, as will be mentioned below, though, of course, there will always be a difference of opinion with regard to a given case until the cause of scarlet fever is definitely known, and the bacillus discovered by Mallory and Medlar in 1916 must be confirmed before it can be accepted as the definite causal agent, while Doehle's bodies also require considerably more investigation before they can be trusted for diagnosis, notwithstanding the support Rehder and Wagner have given to them.

Ætiology.—The keynote to the ætiology of the scarlet fever-like erythemata and dermatites is, in our opinion, struck by the case of the lady suffering from anaphylaxis of quinine origin. Her cutaneous cells, sensitized in some unknown way, were open to produce anaphylactic phenomena on the arrival of the quinine anaphylactogen.

Similarly, the other cases can be explained by the cutaneous cells being sensitized by the chemical products of certain germs, while they received their anaphylactogen from the chemical products of the throat when the slough on the tonsil began to separate, and subsequent to this the anaphylactic phenomena in the form of the scarlet fever-like rash was seen.

A similar explanation can be given of the serum rashes seen on the seventh to ninth day after the serum treatment of bacillary dysentery, and in the rash sometimes following even such a simple procedure as an enema of sterilized warm water in a case of enteric fever.

The whole phenomenon of the rash is therefore a pathological process easy to understand, even if the actual chemical substances causing it are unknown, nor does it by any means stand alone in the ætiology and pathology of disease as similar examples are known.

In other words, we believe that Erythema scarlatiniforme and Dermatitis scarlatiniformis are anaphylactic phenomena produced some six to nine days after the original infection, and that they do not occur unless that infection is severe enough to cause a lesion in the throat, through which, when the sloughs begin to separate, the chemical anaphylactogen can be absorbed, and so act upon the sensitized cutaneous cells. This is, of course, only a hypothesis based upon observation and analogy, but in our opinion it affords a working hypothesis for the cause of the eruption.

Diagnosis.—From the days in the later half of the seventeenth century, when Sydenham clearly separated out his *Febris scarlatina* from measles and Morton maintained that the two were identical, differences of opinion as to whether a disease is or is not scarlet fever are bound to occur until the actual cause of the disease is known. It is therefore necessary in making a diagnosis to pay attention to small details, as the cause of scarlet fever is at present unknown.

For the purposes of the present note it is convenient to consider the diagnostic features of the eruptions mentioned above under the headings:—

A.—Erythema Scarlatiniforme.
B.—Dermatitis Scarlatiniformis.

A. –Erythema Scarlatiniforme.—As already stated above, it is customary to apply this term to those evanescent erythematous blushes seen in dengue and malarial fevers, but it seems to us that these are hardly worthy of this appellation, as no one could possibly mistake them for a scarlet fever eruption, since they lack the minute bright red points situate on a paler background as well as the general symptoms. They therefore should not be termed "*Scarlatiniforme,*" but "*Febrile*" or some other similar term, but we fear that long practice has sanctioned this loose usage of the former term, and that it will never disappear from medical literature.

As we understand Hardy's *Erythema Scarlatiniforme*, it is very like mild attacks of scarlet fever and of *Dermatitis Scarlatiniformis*, but differs therefrom in that:—

(1) Its eruption, though resembling scarlet fever, is relatively slight in amount, mild in character, and is either without definite or, at the most, only very slight desquamation.

(2) There is an absence of many of the signs and symptoms found in scarlet fever, as will be mentioned below under the differential diagnosis.

With regard to the differential diagnosis, the most important point is to distinguish it from scarlet fever. This, in our opinion can be effected by the following characters:—

(1) Appearance of the rash more than forty-eight hours after the onset of the tonsillitis if present.

(2) If the tonsillitis is absent, its absence and the slight oral and pharyngeal symptoms.

(3) The mild and evanescent character of the eruption.

(4) The absence of any considerable amount of desquamation.

(5) The absence of the strawberry tongue.

(6) The absence of marked headache and vomiting.

(7) The absence of circumoral pallor.

(8) The absence of albuminuria.

(9) The absence of infectivity from man to man.

(10) Its occurrence in association with severe tonsillitis in regions of the Tropics where scarlet fever is known to be rare.

It can be differentiated from *Dermatitis scarlatiniformis* by:—

(1) The milder and more evanescent characters of the rash.

(2) The absence of or very slight amount of the desquamation.

B.—Dermatitis Scarlatiniformis.—This disease and its "recidivans" variety show the following characters:—

(1) Tonsillitis is usually present, and is severe and associated with slough formation. It may, however, be absent when the disease is directly due to chemical causes, as in the quinine case.

(2) When tonsillitis is present the rash appears longer than forty-eight hours after the onset of the illness, but when the case is due to chemical causes the rash and the illness coincide.

(3) In the tonsillar form the face is but little affected, and there is no noticeable circumoral pallor. In the chemical form (at all events in our case) the face was markedly affected, and more resembled erysipelas in that region (but only there) than scarlet fever.

(4) The absence of the white and red strawberry tongues.

(5) The absence of severe headache and vomiting.

(6) The absence of albuminuria.

(7) The presence of extensive desquamation, which in the case of chemical origin was over in a week, and in the others lasted longer than three weeks.

(8) The absence of infectivity from man to man.

(9) The presence of recurrent attacks in the recidivans type.

(10) In the case of chemical origin the short duration of the fever and the absence of all symptoms, except slight itching.

The most important point in the differential diagnosis of these rashes is the question: "*Are they or are they not scarlet fever?*" and this is a most difficult matter to decide.

The differential diagnostic points to which we desire to invite attention are the following:—

(1) The delay in the appearance of the rash after the onset of the tonsillitis.

(2) The absence of the strawberry tongue.

(3) The absence of marked headache and vomiting.

(4) The absence of albuminuria.

(5) The absence of infectivity.

(6) The comparative rarity of scarlet fever in the Tropics.

(7) In the case of chemical origin the absence of marked throat symptoms, the rapid fall of the temperature, and the absence of all symptoms except itching.

With regard to other points connected with the differential diagnosis, it may perhaps be as well to state that, as a rule, the ordinary quinine rash is much less punctate than the one we have described and does not often affect the limbs, but it is apt to be associated with throat symptoms, fever, headache and dizziness, and to be followed by a very slight desquamation.

With regard to rashes caused by other drugs, copaiba, salicylate of soda, and belladonna can produce eruptions of the nature of Erythema scarlatiniforme, but of these copaiba perhaps produces the nearest resemblance to scarlet fever, although it often shows signs of urticarial lesions which materially help the diagnosis, as do the dilated pupils in the belladonna rash, but the history of the case is the only means of arriving at a diagnosis.

In our case of Erythema scarlatiniforme the rash appeared some fourteen hours before we administered any salicylate of soda, and this drug did not appear to have any effect in increasing the eruption.

It is hardly possible to confuse the recurrent type of the dermatitis with the erythematous eruption found in filarial infections, but if any doubt exists it may be remembered that the latter are œdematous and localized, while the former are generalized and not often œdematous, and, as a rule, appropriate examinations of the blood will reveal microfilariæ in the latter cases.

Diphtheria, of course, may be associated with a true Erythema scarlatiniforme or Dermatitis scarlatiniformis of the same nature as that described above and having the same ætiology.

Summary.—We are of the opinion that *Erythema scarlatiniforme* and *Dermatitis scarlatiniformis* are anaphylactic phenomena, differing essentially from "*scarlet fever.*"

We further believe that they are varying degrees of expression of the same pathological process which may be brought about by many agents.

We emphasize the fact that "*scarlet fever*" is rare in Tropical Africa and Asia, and is due in all known cases to the importation of the infection, after which it dies away, and has not so far become endemic.

Our only reason in bringing forward these brief notes is that our fellow-practitioners in the Tropics may become acquainted with the difficulties we have met with in the diagnosis of rashes resembling scarlet fever.

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Khartoum,

March 31, 1917.

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NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.

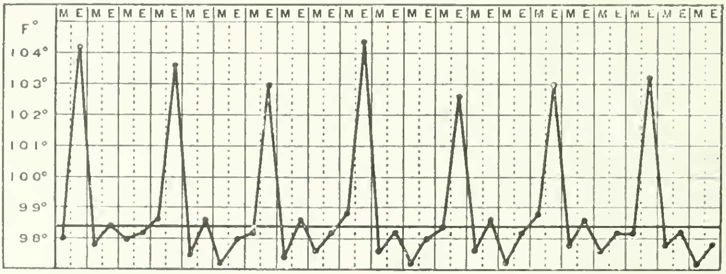
By Lieutenant-Colonel Aldo Castellani, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

(*Continued from* p. 186.)

Quartan Fever of Non-malarial Origin.

Fever recurring every fourth day is considered to be always of malarial origin. There is, however, a type of quartan fever which is not of malarial origin. I first noticed it in Ceylon some years ago, and I have seen two cases in Europe. The condition clinically greatly resembles quartan malaria, as the temperature rises, and may go very high (104° and 105° F.) every fourth day, and there may be rigors at the commencement of the febrile attack, and sweating on the temperature coming down, though these two features were completely absent in one of the cases. The spleen is often not enlarged, the blood is constantly negative for malaria parasites, and quinine given in massive doses, gr. 60 to gr. 80 daily, by the mouth, by intramuscular injection, and by intravenous injection, has no effect whatever on the fever. In the first case I saw in Ceylon the fever recurred regularly every fourth day for four months.



Portion of the Temperature Chart of a case of Quartan Non-malarial Fever.

Rat-bite Fever.

I have seen a typical case in the Adriatic-Balcanic zone in a peasant. The man gave history of having been bitten in the right thumb by a rat. Three weeks after the bite he had an attack of fever which lasted a week, then he had normal temperature for two weeks, then he had two or three attacks monthly, each attack lasting three to seven days. During the attacks an erythematous rash resembling erythema polymorphous was often noticed. The patient came fairly regularly to the outdoor department, but refused to enter the hospital. He was treated with arsenic. His general condition, even during the attacks of fever, always remained fairly satisfactory. As is well known, rat-bite fever is a spirochæte disease, as demonstrated by Futaki.

Trench Fever.

Cases of trench fever have occurred in the Balcanic zone, and the two types described on the Western Front have been also observed in the Balkans. One of the two types described with several relapses somewhat resembles rat-bite fever, and certain cases are of spirochætic origin.

Low, Intermittent, Non-malarial Fever.

Of this condition, which is not rare in my experience in the Tropics, I have seen a typical case in Serbia. The patient felt well in the morning, but about midday every day complained of feeling chilly and out of sorts. There was no real shivering fit. The temperature rose daily between 99° and 100° F. At night it slowly came down to normal or subnormal. No sweating. The physical examination of the patient revealed nothing; liver and spleen not enlarged.

The microscopical examination of the blood was always negative for malaria. There was a distinct increase in the eosinophiles (5 per cent.), though no ova of any kind were found in the stools, and the administration of various antihelminthics was not followed by the expulsion of any worms, nor did the fever stop. This feature (eosinophilia) was present also in some of my Ceylon cases. The fever lasted three and a half months. Quinine in massive doses was given for thirty days without the slightest benefit.

This fever must be distinguished from another type of very low fever, clinically very similar, but which is of tubercular origin, though the patient shows no sign whatever of this infection except often a positive cuti-reaction. The patient, however, later on frequently develops pulmonary tuberculosis.

High Intermittent Non-malarial Fever.

Of this type of fever described by me in Ceylon some years ago, I have seen a case in Skoplji (Serbia) in 1915. The patient, a little boy 5 years old, of well-to-do Serbian parents, was suffering from intermittent fever since two months when I saw him. Apart from a slight degree of anæmia he looked well, had not lost flesh, was taking his food satisfactorily, and was running about and playing like an ordinary healthy child, but every day the temperature in the late morning rose and lasted several hours, reaching 104° F. and more: no shivering fit at the onset, and no perspiration when the temperature was falling down. Spleen and liver not enlarged. Apart from a slight decrease in the red blood cells, the blood was normal. Microscopical examination for malaria always negative. Serological and cultural investigations for *M. melitensis*, *M. paramelitensis* germs of the typhoid-paratyphoid group and intermediate micro-organisms negative. Urine normal. No worms and no protozoa in the stools. In these cases quinine, arsenic, methylene blue, &c., have no influence whatever. The only satisfactory treatment in my experience is a change of air. I saw once in Ceylon a European child who had suffered from this type of fever for five months; it had resisted to quinine given in enormous doses; it stopped suddenly on the child going with his mother to India, twenty-four hours after arriving at Madras. A sea trip is very efficacious.

TYPES OF JAUNDICE COMMONLY MET WITH IN THE BALKANS.

Jaundice is, of course, not a disease, but a symptom, and may be found in practically every malady, as, for instance, in lobar pneumonia, Malta fever, filariasis, &c. The type of jaundice I have met with most frequently in the Balkans and Adriatic zone is camp-jaundice.

Camp-jaundice (Icterus castrensis).

I differentiate two varieties (1) The severe type, Weil's disease, *Icterus castrensis gravis* (comparatively rare); (2) the mild type, *Icterus castrensis levis* (very common).

In the severe type—Larrey-Weil's disease—the onset is generally abrupt, with very high fever and occasional shiverings. The patient is flushed; he feels and looks very ill. The spleen and liver are often enlarged, and occasionally some of the superficial glands are palpable. Jaundice appears two or three days after onset, sometimes later, but always before the fever drops. Hæmorrhages are a common factor, and petechiæ are often present. The temperature drops by crisis or by rapid lysis from the eighth to the twelfth day, but there is often a short relapse. The prognosis is a serious one, and the treatment very unsatisfactory.

Icterus castrensis levis.—This is very common; two periods may be distinguished: the pre-jaundice period and the jaundice period. The pre-jaundice period may be a very long one. The patient feels tired, complains of aches in various joints and muscles for weeks, the skin may appear to be normal, and the temperature is either normal or not very high, 99° to 100° F. The patient has often the sensation of suffering from very high fever, while on taking his temperature he may find it normal or subnormal. During this stage very often the urine is darker than usual and contains biliary pigments. I have come across patients feeling fairly well, but complaining of what they called rheumatism for months before the jaundice appeared; others had remarked the staining of their shirts by the urine. This stage may last for several weeks; in one of my cases it lasted three months before the jaundice appeared.

The Jaundice Stage.—First the scleroticæ, then the skin, slowly become icteric. The degree of jaundice is seldom so marked as in cases of true obstructive jaundice. The patient generally feels absolutely done up, with often pains and aches all over the body; as a rule there is very little or no pruritus, in contrast to so many other types of jaundice. He has no appetite, and may feel inclined to vomit. The temperature is normal or subnormal, pulse usually slow, but may be of normal frequency; the spleen generally is not palpable, nor is the liver in most cases; there may be pain on pressure in the region of the gall-bladder, but this is not a constant symptom. There is often constipation, and the stools may be whitish or of the usual brownish colour; at times there are periods of diarrhœa, alternating with periods of constipation. The urine is scarce and very dark-coloured; it may contain a trace of albumin and casts. The jaundice stage lasts between two and eight weeks. Recovery is slow, and for weeks and months after the jaundice is over the patient may feel very weak.

As regards the *etiology* of camp-jaundice, it is well known that the severe type, Weil's disease, is of spirochætic origin; but I believe, as I have stated in previous communications, that the mild type is also of spirochætic origin. In my opinion it has nothing to do with paratyphoid, as stated by various recent authors. In several cases, as I have stated in previous communications, I have found spirochætes in the urine after repeated centrifugalization (Indian ink method, Giemsa staining); once only in the blood. I believe that there are several species or varieties of the organism described by Inada and Ido. For instance, in certain extremely mild cases with very slight or no jaundice, the spirochætes found in the urine are distinctly thicker, and have sharper and better defined waves (*S. mitis*). As regards other types of jaundice found in the Balkans, I may mention:—

(1) *Jaundice of Malarial Origin.*—Malaria is such a proteiform disease that it may at times simulate Weil's disease very closely, at times, more rarely the usual mild type of camp jaundice.

(2) *Jaundice of Paratyphoid (and Typhoid) Origin.*—This in my experience is extremely less frequent than it would appear to be from the researches of other observers. Clinically, the patient has the symptoms of paratyphoid, with fever, dirty tongue, slight enlargement of the spleen, tumid abdomen; the jaundice may develop during the course of the fever or after; the clinical appearance is quite different from the so-called camp jaundice. Bacteriological examinations are positive, either for paratyphoid or typhoid.

(3) *Icteric Type of Relapsing Fever.*—This type

of jaundice, of which I have seen several cases in the Balkans, did not escape the observation of the old clinicians; they called it "icteric typhus" and "bilious typhus." The icteric type of relapsing fever is generally very severe.

Splenomegalic Jaundice.

A type of splenomegalic jaundice has been seen by me in Serbia in young people—mostly girls between 18 and 24 years of age. The malady generally begins with repeated attacks of fever (usually taken for malaria), which is never very high. The patient becomes anæmic, also very weak. Very slowly a trace of jaundice appears in the scleroticæ, then the skin becomes yellow; the degree of jaundice, however, is always slight. A very important feature is the enlargement of the spleen; the organ may reach the umbilicus, is hard, but very smooth, and reminds one of the spleen found in leukæmia and pseudo-leukæmia. The liver is not enlarged; lymphatic glands not palpable. Stools of normal colour, urine may be of almost normal appearance, but generally contains urobilin, and at times bile pigment. The blood shows a distinct leucopænia; no parasites were found. In a case clinically very similar I have recently seen, spirochætes were found by me in the urine.

BLACKWATER FEVER.

This disease has been reported several times from Greece. I saw a typical case which ended fatally in Macedonia in 1915. No malarial parasites were found either in the blood or organs.

SPIROCHÆTIC PURPURA.

I have seen in the Balkans two cases of purpura with spirochætes in the urine. No signs of jaundice. In one the spleen was hard and greatly enlarged.

SCORBUTUS.

Cases of scorbutus have occurred in the Serbian troops.

BERIBERI.

The disease has been reported from Gallipoli, and I saw two cases at Salonika in 1915. I have not seen any cases in Macedonia or in the Adriatic zone. I have already called attention to the occurrence of cases of pseudo-beriberi of malarial origin.

PELLAGRA.

Pellagra is common in certain districts of Macedonia. I saw quite a number of cases in peasants coming from localities not very far from Uskub in 1915. I have seen a case in a Serbian soldier, 35 years of age. He had the typical skin lesions on the hands; these lesions had been taken for chronic eczema. He complained of great weakness and of diarrhœa, and stated that all the symptoms disappeared in winter.

DYSENTERIES.

Bacterial dysentery is extremely common in the Balcanic zone, especially in the summer and early autumn, but I have observed quite a fair number of cases also in the winter months. The germs found have been the Shiga-Kruse, the Flexner, the Hiss, and several intermediate ones not yet classified.

I will not spend much time on the subject of dysentery in the Balcanic zone, as the subject was ably treated in a lecture by Sir Ronald Ross not very long ago.

I would, however, call attention to a peculiar clinical type of bacterial dysentery which has been the cause of much difficulty of diagnosis in the Balcanic and other zones, the *choleraic type*, of which, as a matter of fact, I have also seen several cases in Ceylon, where it is called *serous diarrhœa*. The onset is sudden; the patient passes a large number of serous motions which certainly resemble those of cholera; in most cases, however, a motion is now and then tinged with blood. The bacteriological examination shows absence of the cholera vibrio, while in most cases germs of the dysentery group are present.

A few words as to treatment. There is often a tendency among practitioners with no tropical experience to treat dysentery with astringents (bismuth, &c.) from the very beginning. It should not be so treated. Every medical man with long tropical experience will agree with me that in the first stage the disease must be treated with aperients, especially if serum is not used. The treatment of bacterial dysentery should always start with a dose of castor oil or with mag. sulph. in 1-drachm doses every hour, or 2 drachms every two hours for twenty-four to forty-eight hours; then astringents, such as the following, should be given in massive doses:—

(1)	Bismuth sub.	gr.xxx
	Liq. morph. hyd.	♏ii
	Aq. chloroform. ad	℥i

Every two hours day and night for several days.

(2)	Ac. gallici	gr. lx
	Alcohol	℥i
	M. et adde—	
	Ac. sulph. dil.	♏xx
	Glycerine	ʒiv
	Liq. opii sed ...	♏xxx
	Aq. chloroform. ad	℥vi

One tablespoonful hourly.

No. 2 formula is Whitla's mist., used in typhoid hæmorrhages, but it answers well also in certain cases of dysentery.

As regards irrigations, these are generally badly borne in acute cases; in subacute and chronic cases they are very useful. The following will be found efficacious in many cases:—

(1)	Ac. gallici or ac. tannici ..	ʒi
	Liq. opii	♏ xxx
	Aq. ad	O i to O ii

In subacute cases.

(2)	Argent. nitr.	gr. xx
	Water to	O ii

In very chronic cases.

Serum treatment is on the whole efficacious. I use a polyvalent serum. It should be given in large doses. The serum treatment should always be supplemented with the internal treatment I have described.

Two *complications* or sequelæ I have noticed several times in the Balkans are parotitis and polyarthritis. It is important to make the exact diagnosis, as in polyarthritis from dysentery the salicylates have practically no action, while the serum treatment, and occasionally the vaccine treatment, are useful, though far from giving brilliant results.

As regards *prophylaxis*, in addition to the usual precautions, I have been advising since 1904 vaccination, using a polyvalent dysentery vaccine or a combined dysentery + typhoid + paratyphoid vaccine.

The drawback to the usual dysentery vaccines is that they give an extremely severe local and general reaction; but, as I demonstrated long ago, a vaccine can be obtained which does not give a very severe reaction by using the following directions:—

(1) As I have stated in all my publications since 1904, the vaccine should never be prepared with broth cultures, as such vaccine often gives a most serious reaction with very severe infiltration, and occasionally an abscess.

(2) A dysentery vaccine should contain several species of dysentery bacteria, and not one only.

(3) A good method of preparing the vaccine is by using a carbolic salt emulsion from agar cultures, or peptone-water cultures may be used, as I did in 1904. It is essential to prepare the vaccine with strains which, though rich in antigen, are not virulent, or very slightly so. It is extremely rare to come across such a strain of the Shiga-Kruse germ. A large series of strains of this species are inoculated into rabbits, and the least virulent, provided it is rich in antigen, is kept permanently as a stock culture to prepare the vaccine. For further particulars on the preparation of such vaccine the reader is referred to my papers, published in the Ceylon Medical Reports for the year 1904, in the *Transactions* of the Society of Tropical Medicine (December, 1915) and the *British Medical Journal* of February 26, 1916.

Of sensitized dysentery vaccines I have very little experience, but Broughton-Alcock has had good results. The reader is referred to Broughton-Alcock's interesting paper in the *Brit. Med. Journ.* of August 8, 1914.

Amœbic Dysentery.

I will limit myself to stating that in my experience amœbic dysentery in the Balkans is somewhat less common than the bacterial type, and that the distribution of the disease appears to be somewhat patchy. I have seen several cases of mixed infection, amœbic and bacterial. In emetine we have a specific which quickly induces a clinical cure, but unfortunately in a number of cases a complete sterilization of the patient is not achieved. In certain cases I have found great benefit in giving high injections of emetine, and at the same time the old-fashioned ipecac. by the mouth, which may be given in the shape of "membroids" to prevent as far as possible vomiting. Emetine may be given also by the mouth in the form of salol-coated pills. The iodide of bismuth and emetine, gr. 2 to 3 daily, as shown by Dale, Low, Dobell, &c., has a powerful action, but causes very often distressing vomiting. It may be given in pills made up with syrup and salol. Emetine is on the whole a very safe drug, but if given too long it may give rise to diarrhœa. I have seen a case of erythematous rash, followed by desquamation, apparently due to emetine.

Flagellates Diarrhœa.

Flagellates diarrhœa is far from being rare among our troops in the Balkans and Adriatic zone. The flagellates found in most cases are *Lamblia intestinalis* Lambl. 1859; *Trichomonas hominis* Davaine 1854; *Cercomonas hominis* Davaine 1854; *Tetramitus mesnili* Wenyon 1910. In three cases I have found a Provazekia very similar to *Provazekia asiatica* Castellani and Chalmers 1910, and in one case a parasite apparently identical to *Heteromita zeylanica* Castellani and Chalmers 1910. It is probable that when flagellates are present in small numbers they give rise to no symptoms. In the Tropics I have found them in the stools of 25 per cent. of apparently healthy persons after a saline purge, and in the Balkans in summer in 15 per cent. When present, however, in large numbers the probabilities are that they play an important part in the causation of the intestinal symptoms. Lamblia seems to have a much more distinct pathogenic action than the other flagellates. The patient complains of diarrhœa, with yellowish motions; there may be a little mucus, but blood and pus are never present in my experience. The course is often a long one, and the treatment very unsatisfactory.

Recently Dale, Low, Wenyon, Woodcock, Penfold, and others have carried out investigations on the subject. Emetine, beta-naphthol, salicylic acid, salol, thymol, cyllin have all proved inffective in Low's hands, though Woodcock and Penfold claim to have cured a case by a combined use of Beta-naphthol and bismuth salicylate. I still use and recommend the treatment I first introduced for the condition in 1905, viz., methylene blue. This treatment was the result of certain experiments made jointly by Dr. Willey and myself, when we tried the action on flagellates of various chemical substances. Without referring in particular to all the experiments, I may say that methylene blue solutions were by far the most active, much more so, for instance, than quinine hyd. solutions. Mixing one loopful of 1 in 1,000 solution of methylene blue with a loopful of fæces containing numerous flagellates, the flagellates were seen microscopically to take up the colour and stop, almost instantly, their movements, losing their shape and becoming globular without exhibiting any flagella or undulant membrane. These experiments I have repeated very recently with the same result.

The treatment is carried out as follows: The first two or three days aperients are given (sod. and mag. sulph., &c.), then methylene blue is begun to be given by the mouth in cachets containing gr. 1 to 3 of the drug t.d., and also by intestinal irrigation (1 in 5,000, 1 in 3,000). The drug must be absolutely pure, free from arsenic. Each dose may be mixed with salol, gr. 5. The patient must be informed that his stools and urine will become blue. In obstinate cases the administration of the drug may have to be persisted in for a long period of time, and in such contingency the drug should be discontinued from time to time to prevent the formation of methylene blue concretions in the intestine. In most cases I have had a rapid decrease or complete disappearance of the flagellates, though a complete sterilization is very rare, a few flagellates reappearing from time to time, especially after taking an aperient. The methylene blue treatment had no action on lamblia infections, and may occasionally irritate the bladder and kidneys.

Ciliar Diarrhœa and Dysentery.

I have seen two cases in the Balkans of ciliar dysentery due to *Balantidium coli* Malmsten 1857. The treatment is unsatisfactory, but ipecac. and emetine seemed to induce an improvement.

Coccidiosis.

Coccidiosis is, comparatively speaking, common in the Balkans. Captain Richards has described, for instance, fourteen cases from the 43rd General Hospital, Salonika. I have seen six cases, all in Macedonia. In two there was diarrhœa; the others did not show any intestinal symptom. The treatment is very unsatisfactory. I have tried emetine and a long series of so-called intestinal disinfectants with very poor results. In two cases methyl. blue seemed to act beneficially.

Famine Diarrhœa.

In the soldiers who were in the Albanian retreat and actually starved for weeks a peculiar type of diarrhœa developed, of which I saw several cases in the Adriatic zone. The patient wastes terribly, but his abdomen is often prominent and distended; he is extremely weak, he may feel famished, but when given food cannot digest it; complains of slight abdominal pains and diarrhœa; the motions may not be very numerous, eight to ten a day; they are liquid but generally with a fæcaloid colour; some mucus may be present, but very seldom pus, and never blood. Amœbæ and bacilli of the dysentery group absent. Astringents, even when given in massive doses, may not stop the diarrhœa; in other cases they may control it, but the patient continues to become weaker and weaker, and very often dies of inanition. The condition may last only a few days, or may go on for several weeks, and may have to be distinguished from tubercular enteritis.

The condition is very similar to a type of famine diarrhœa described long ago by officers of the Indian Medical Service.

Cholera.

On the whole there has so far been very little cholera in the Balkans during the last two years, but none of the precautions taken should be relaxed; and the cholera vaccination should be continued. My tetravaccine, typhoid + paratyphoid A + paratyphoid B + cholera has been adopted by the Serbian Army; it was used by me in Ceylon in 1913, and by myself and Mendelson, by the American Commission, and Colonel Rendon in 1915. For details on the tetravaccine the reader is referred to the paper published by myself and Mendelson in the *British Medical Journal*, November, 1915.

Paracholera.

This term was introduced by me some years ago to denote cases which, though clinically hardly distinguishable from cholera, are due to vibrios somewhat different from true *V. choleræ* Koch. In Ceylon I have described under the term *V. paracholeræ* (= *V. kegallensis*), one such vibrio, which is undoubtedly the cause of several outbreaks of cholera-like disease, with profuse serous diarrhœa, severe vomiting, muscular cramp, &c.; several cases terminated fatally. A vibrio serologically and culturally identical with the Ceylon strains I have found in the stools of a soldier who was alleged to have been suffering from cholera in Albania. I have described *V. paracholeræ* in various papers, the most recent of which is in the *British Medical Journal*, March 29, 1916. In that paper the cultural and serological reactions of the germ will be found.

Choleraic Diarrhœas.

In addition to true cholera and paracholera one comes across cases showing clinically symptoms of cholera, such as profuse serous diarrhœa, algidity, muscular cramps, but of very different etiology.

The commonest choleraic diarrhœas met with in tropical and subtropical zones, Balkans and South of Europe may be classified as follows:—

(1) *Food-poisoning Choleraic Diarrhœas.*—In practically all my cases *B. aertryke* was found. It is very important to differentiate between *B. aertryke* and *B. paratyphosus* B. This cannot be done either by cultural methods or by agglutination, but it can be done by using my absorption method, as demonstrated by Boycott, Bainbridge, and O'Brien.

(2) *Choleraic Diarrhœas due to Bacteria of the Dysentery Group.* (See Bacterial Dysentery.)

(3) *Choleraic Diarrhœa,* or *Pseudo-cholera of Malarial Origin.* (See Malaria.)

Sprue.

I have seen a typical case of sprue in Skoplje in 1915 in a Macedonian woman. She was extremely anæmic, and complained of chronic diarrhœa, with white frothy stools. The tongue was slightly atrophied, with a smooth, glossy appearance, and a few disepithelized patches. She was ordered a milk diet, and a quantity of tins of milk was supplied to her. She improved, but after a few weeks was lost sight of.

(*To be continued.*)

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 1, 1917.

BLINDNESS IN INDIA.

MR. C. G. HENDERSON, of the Indian Civil Service, writing from 62, West Hill, St. Leonards-on-Sea, Sussex, England, has published a pamphlet, issued by King Bros. and Potts, Ltd., 66, Norman Road, St. Leonards, which, although intended for lay readers, it would be well were medical men to peruse, especially for those who do not know India.

Mr. Henderson's intention is to raise funds or in some way to meet and stem the scourge of blindness in India and, in fact, in every warm climate, more especially where the soil is dry, arid, and sandy. The direct remedy for the trouble is no doubt to increase the numbers of medical men capable of dealing with cases of "curable" blindness; but the prevention of the causes of blindness must be the ultimate goal and object of attainment if the greatest good is to be brought about.

There are many excellent ophthalmic surgeons in India; there are many admirable clinics and hospitals in the large centres where skilled treatment of the highest value and reliability are attainable, but these are few and far between. In the country districts and the small villages skilled advice is unattainable, except by long distance journeys over indifferent or bad roads, involving an expense which the poor cannot afford. Now and again a native quack visits the village and contributes to the delay of seeking competent advice, and so to the destruction of sight. Extracts from Mr. Henderson's publication will show what the evil amounts to, and what he seeks to do to alleviate and prevent blindness in India. The article opens with the statement:—

There are about 600,000 blind persons in India. This figure relates to the *totally* blind. It does not include people who are going blind or people with some degree of vision, nor those whose defective sight is such that, though not altogether blind, they would, in England, be regarded as fit subjects for a blind school. If all these were included the number would be vastly increased.

It goes almost without saying that the backwardness, apathy, and ignorance of the population is one of the causes of the existence of the evil. It is, in fact, the main cause. For blindness is, for the most part, a preventable affliction, and where the people are sufficiently educated to take the simplest precautions and to avail themselves of medical advice and assistance, even when this involves some trouble and a little expense, the incidence of blindness is unlikely to be little, if any, higher than in a country like England.

Blindness is, to the extent probably of 90 per cent., a preventable affliction. If there are some 30,000 totally blind persons whose blindness could not be alleviated, there are some 500,000 who, under proper conditions, need never have been blind at all. Apart from cataract, the chief specific causes of blindness in India are: small-pox; eye diseases like conjunctivitis, trachoma, pannus, keratitis, &c.; and ophthalmia neonatorum. Small-pox is a preventable disease, and even if it is contracted and the eyesight is threatened, loss of sight is preventable by medical treatment. Conjunctivitis, trachoma, pannus, and keratitis can all be overcome by continued proper treatment, and, if so treated, need never result in blindness. Ophthalmia neonatorum, the purulent conjunctivitis which attacks children at birth or shortly after, and so often resulting in total blindness, can be conquered if proper medical treatment is taken in time.

In India we have a population which amounts to two-thirds of our Empire and one-fifth of all the world. Is it impossible to devise means to give sight to some of the 30,000 totally blind whose blindness is in greater or less measure remediable, and to rescue some at least of the half million who every generation go blind from causes that are preventable? Would it be possible to found some agency or institution, with adequate funds, to work in this field? This is perhaps not the place to elaborate a scheme, as considerations of space would probably forbid, though with some experience of the conditions I have for some time past had under consideration measures which might be found workable in attacking the problem. But at present there are no funds, and unless interest is aroused in the question, it is useless to go into details here. But Mr. Henderson sets forth the broad lines on which the work might be attempted, which are something as follows:—

(1) Carrying on campaigns against ophthalmia neonatorum in cities, in collaboration with municipal authorities, and attempting to extend this preventive work to villages and small towns. Even if confined to cities, this work would be one of the greatest importance.

(2) Finding out the blind, and attempting to bring the benefits of modern surgery to them whenever required. In part, at least, this might be done by travelling ophthalmic surgeons, by pecuniary assistance to the poorer sufferers to enable them to attend hospitals, &c.

(3) Keeping in constant touch with sufferers from various kinds of eye complaints and getting them treated through village medical agencies, which would have to be established.

(4) Establishing ophthalmic hospitals and dispensaries, by preference the latter, for it is probable that, for the same expenditure, a number of small institutions would be more effective than a few large ones.

Mr. Henderson's summary of steps to be taken are excellent; the difficulty, however, is the enormity of the field of work and the expense involved. To provide ophthalmic surgeons for such a task is well-nigh impossible; for to be a qualified ophthalmic surgeon a man or woman must be a fully qualified doctor. This takes five years of expensive training, and then another two years special study of eye work before the doctor is fit to practise this department of medicine and surgery. The work in India is done by members of the Indian Medical Service and by Indians who have graduated in the medical schools of India. The Indian Medical Service men have other duties to attend to, and their ophthalmic work is only a side issue, or something added to their daily task.

Moreover, it must be remembered that the young Indians who take up private practice will seek their fortunes in the cities and large towns, not in the mofussil. The consequence is that the country districts are neglected and blindness runs riot.

The writer would suggest that the system of Health Visitors, as practised in Britain, would present the best method of contending with this great Indian scourge. The natives in the country districts, and in the towns as well, require to be visited and encouraged (or it may be compelled) to send their children for treatment. Compulsion is a hard term, but it is neither to the benefit of the children nor the State, and least of all to the parents, that ignorant prejudice in a matter of this kind should be permitted. But Indians are no different to people in other countries, who are just as prejudiced against hospitals and doctors in many instances as are Indians, and the moment they are persuaded of the advantages offered them, and especially the saving of sight, they will willingly, if encouraged, fall in with the wiser and saner counsels of those who know best.

Mr. Henderson adds: "Will any help—financially or personally, or by suggestions for a scheme of work or by helping to build up an agency to undertake it? I would gladly hear from any such if they would communicate with me.

"I have written of India—for it is there that my experience has been, little enough though it is. But the question is of world-wide importance, and has, it seems, received hitherto too little notice from workers for the blind and others."

Mr. Henderson should address the "Humanitarian Corps" at the College of Ambulance, 3, Vere Street, London, W.1, for assistance in regard to the scheme he has on hand.

Notes and News.

A Degree in Commerce (B.Com.) is now granted by the University of Edinburgh. A Faculty of Commerce is in contemplation should the practical results justify so important a step.

Quinine production in India is chiefly confined to the Nilgiris Hills in the Madras Presidency and to the Darjeeling district in Bengal. The amount produced at the Nilgiris manufactories averages about 30,000 lb. annually, whilst at Darjeeling it is about 50,000 lb.

The species of cinchona cultivated in India are: (1) *Cinchona succiruba* (red bark); (2) *C. calisaya* and *C. ledgeriana* (yellow bark); (3) *C. officinalis* (crown bark). The last-named is the species mostly cultivated in India; the *C. ledgeriana* is mostly grown in Darjeeling.

The amount of cinchona bark required annually throughout the world for the production of quinine averages between about 16,000,000 lb. Java planters produce about 80 per cent. of the world's bark, and the modern trade is chiefly centred in Amsterdam.

Original Communications.

A SUMMARY OF OUR KNOWLEDGE OF INSECT VECTORS.

By Malcolm Evan MacGregor.
Wellcome Bureau of Scientific Research.

So much has been said about insects since the War began that it is, I think, advisable that some attempt should be made to summarize our knowledge of the more important insect-borne diseases and their vectors. While insects have long been suspected of being responsible for the transmission of serious diseases, it may be said that practically the whole of our knowledge of insects in this rôle has been acquired within the past twenty years. So rapidly, however, has the charge of this offence been made out against them that, although it is common knowledge they have been proved guilty, it is not generally realized upon how many counts the verdict rests.

It has lately been my good fortune to give class instruction for the War Office to officers of the R.A.M.C. who are proceeding to the East, and, in order to bring home to my audience the importance of the connection between insects and disease, I have compiled the tables which I now publish. These can in no way claim to be complete, but merely present the more important insect-borne diseases, including important human diseases that on certain grounds are suspected of having insect vectors. With these tables I also publish one (Table VI) which includes the chief insects and acarina that are directly the cause of disease in man and his domestic animals. To complete the list of insect-transmitted diseases would demand the consideration not only of other mammals as hosts, but also of avian and reptilian hosts. In the present instance this would be to carry the subject beyond general interest, but it must be remembered, therefore, that, long as the present list of charges is, insects are not here arraigned on all the counts that might with justice be preferred against them.

During the last few years medical entomology has been rapidly establishing itself as an invaluable branch of preventive medicine, and with the outbreak of the present War a great deal of interest and study has been devoted to this subject in Europe, notably in connection with the transmission of typhus fever by lice, and the dissemination of bacteria and other organisms by flies. Moreover, the importance of insect vectors has been generally realized, and many of the astonishing interactions between pathogenic micro-organisms and certain arthropoda have become popular knowledge.

Centuries ago insects were suggested as being possibly concerned in the spread of disease, and from time to time such logical hypotheses were advanced that it is surprising that the establishment of the truth was not sooner forthcoming. In 1577 Mercurialis, an Italian physician, suggested that plague, which was then ravaging Europe, was spread by flies feeding upon the diseased and dead, and later depositing fæcal matter on food consumed by healthy persons. This idea held ground, and various suggestions occur as to the spread of disease by flies in the literature of the eighteenth century. Edward Bancroft in 1769 advanced the theory that "yaws" was transmitted by flies feeding on diseased subjects, and carrying the contagion by settling on open wounds or scratches on healthy persons.

In 1848 Dr. Josiah Nott, of Mobile, Alabama, published a remarkable article in which he gave reasons for supposing that yellow fever was an insect-borne disease. However, although he mentioned many insects, he did not specify any insect as the particular vector.

The connection between malaria and the mosquito had long been held, it is said, by the Italian and Tyrolese peasants, and even by the natives of East Africa, but the first charge brought against the mosquito in the spread of disease by scientific authority was in connection with yellow fever.

In 1853 Dr. Daniel Beauperthuy, a French physician, wrote ably arguing that yellow fever and other fevers were transmitted by mosquitoes, but in those days there being no accepted belief in a contagium vivum, he concluded that the virus was obtained from decomposing material that the mosquito had consumed, and which was later accidentally inoculated into man. Raimbert in 1869 showed by experiment that anthrax could be disseminated by flies.

Epoch-making in the history of our knowledge of insect vectors was Manson's discovery in 1878 that *Filaria bancrofti* was spread by mosquitoes, but at first he thought the *filariæ* escaped from the insect into water, and reached man in this manner. Later work by Manson and his colleagues determined the exact means of transmission.

It was not until twenty-eight years after Beauperthuy's theory that Charles Finlay, an American of Havana, in 1881 definitely attributed the transmission of yellow fever to a mosquito of a definite species. He had noticed the connection that seemed to exist between the presence of large numbers of *Stegomyia fasciata* and the prevalence of yellow fever. He then attempted to transmit the disease experimentally by the bites of this mosquito, and although his experiments are open to criticism, there is no doubt that he did succeed in doing so.

Three years later, in 1883, another American, A. F. A. King, advanced the first well formulated mosquito-malaria theory, and in 1898 Ross, in India, demonstrated beyond doubt the important rôle played by mosquitoes in the transmission of malaria.

In 1899 the American Yellow Fever Commission (Reed, Carroll, Lezear, and Agramonte) were sent to Cuba, and were there able to demonstrate with certainty that yellow fever is transmitted by *S. fasciata*.

It is interesting thus to note the almost parallel development in time of our knowledge of two of the most important insect-borne diseases. To deal even briefly with the historical aspects of our knowledge of other diseases tabulated below would be to consume a large amount of space, and the foregoing account will have indicated the path that has led to subsequent discoveries whose histories are readily available.

I will pass, therefore, to a few notes on each of the tables.

NOTES TO TABLE I.—DISEASES OF UNKNOWN ORIGIN.

The majority of these diseases are doubtless caused by living viruses; often organisms of ultramicroscopic size, and commonly referred to as "filterable viruses."

In the case of pellagra it would appear, however, from the most recent work that, although it is still considered by many persons to be a possible insect-borne disease (and, according to Sambon, having a likely vector in either the *Ceratopogoninæ* or *Simuliidæ*), Goldberger in America considers it a disease now certainly attributable to vitamine-starvation through an unbalanced diet. If this is the case there is no causative organism and no vector, and pellagra should be ruled out of present consideration. The question, nevertheless, is by no means settled.

THE MORE IMPORTANT INSECT-BORNE DISEASES OF UNKNOWN ORIGIN.

N.B.—Names between square brackets = certain vectors; names without square brackets = probable vectors; names followed by ? = possible vectors.

Organism	Host	Disease	Vector
?	Man	Dengue (breakbone fever)	[Sandflies (Phlebotomus), Mosquitoes. *C. fatigans*; *S. fasciata*]
?	,,	Three-day fever, *syns.* "Dog disease," Sandfly fever, Phlebotomus fever	[Sandflies (Phlebotomus) Mosquitoes. *C. fatigans*; *S. fasciata*]
?	,,	Yellow fever	[Mosquitoes (*Stegomyia fasciata*)]
?	,,	Trench fever	Lice ?
? Salivary toxin ?	,,	Tick paralysis (American)	[Ticks (*Dermacentor venustus*)]
? Salivary toxin ?	,,	Tick paralysis (Australian)	[Ticks (*Ixodes ricinus*)]
?	,,	Rocky Mountain spotted fever	[Ticks (*Dermacentor venustus*)]
?	,,	Japanese river fever (shima mushi)	[Mites (*Larval trombidiidæ*)] "aka mushi"
?	,,	Acute anterior poliomyelitis	? Many insects have been claimed as vectors, notably *Stomoxys calcitrans?*
?	,,	Pellagra	? Gnats of the genus Simulium have been claimed ?
?	,,	Typhus fever	[Lice]

TABLE I.

The virus of acute anterior poliomyelitis is still not isolated with certainty. Flexner and his colleagues have been able to cultivate a filterable micro-organism which produced the disease in experimental animals, and more recently Rosenow and his fellow workers have isolated a polymorphous streptococcus, with which they were also able to produce paralysis in certain animals. Nuzum and Herzog were able to do likewise by a Gram-positive micrococcus isolated from the brain and spinal cord of persons dead from the disease.

Poliomyelitis has been very generally suspected of being transmitted by insects, particularly by *Stomoxys calcitrans* (the stable-fly), fleas, and *Tabanidæ* (gad-flies). Nevertheless, it appears more likely that it has an aerial transmission, infection being acquired through the buccal and nasal mucous membranes.

The causative organism of Rocky Mountain spotted fever, Wolbach claims to have discovered in the bodies of infective ticks (*Dermacentor venustus*).

NOTES TO TABLE II.—DISEASES OF BACTERIAL ORIGIN.

In the majority of cases diseases of this class have an *indirect* transmission by insects—that is to say, instead of the organism entering the body of the host through inoculation by the bite of an insect (*direct* transmission), the organisms are carried in or on the insect's body, and are deposited by contact on human food or skin abrasions, and in this manner cause infection.

Bacillus tuberculosis may be disseminated by house flies feeding on infective sputum, as was first shown by Spillman and Haushalter (1887), and subsequently by the investigations of other workers. With the high vitality and resistance to drying possessed by the *B. tuberculosis*, the possibly long incubation period within the body and the insidious onset of the disease, the danger from *Musca domestica* in this connection is still not sufficiently recognized.

Human infection with plague and typhus has been shown to be acquired principally by the entrance of the virus through skin lesions, the insect vector having been crushed either during or after the act of blood-sucking. The stomach contents or infected excreta may be rubbed into the lesions or gain entry through abrasions caused by scratching.

This, however, does not preclude the possibility of direct infection also occurring, at least sometimes in the case of plague, as the infected flea has the proventriculus occluded by the plague organisms when the flea infection is at its height. Septicæmia following mosquito bites occasionally happens, and as likely as not the pathogenic organisms are introduced when the mosquito bites. Direct transmission by blood-sucking insects may possibly also occur in certain instances in the spread of tuberculosis and leprosy.

If Wolbach's organism (see Table I and notes thereto) is proved to be the cause of Rocky Mountain spotted fever, this will also be a disease of bacterial origin with *direct* transmission through a tick, *Dermacentor venustus*.

The more important Insect-borne Diseases of Bacterial Origin.

N.B.—Names between square brackets = certain vectors; names without square brackets = probable vectors; names followed by ? = possible vectors.

The word "flies" includes in the main: *Musca domestica*, *Fannia* sps., *Calliphora* sps., *Lucilia* sps., and *Sarcophaga* sps.

Organism	Host	Disease	Vector
Bacillus anthracis	Man and animals	Anthrax	[Flies], *Tabanidæ*? Beetles?
,, *dysenteriæ*	,,	Bacillary dysentery	[Flies] (*Musca domestica, Calliphora* sps., *Lucilla* sps.)
,, *lepræ*	,,	Leprosy	Flies? Fleas? Bed-bugs? Skin mites? Mosquitoes?
,, *paratyphosus A*	,,	Paratyphoid fever	[Flies]
,, ,, *B*	,,	,, ,,	[Flies]
,, *pestis*	,, and rats	Plague	[Fleas]
,, *tuberculosis*	,, and animals	Tuberculosis	Flies, cockroaches, fleas? Bed-bugs?
Bacillus typhosus	,,	Typhoid fever	[Flies]
Bartonia bacilliformis x-bodies	,,	Verruga	[*Phlebotomus verrucum*]
Spirillum choleræ	,,	Cholera	[Flies], cockroaches, ants. Although the main channel of infection is the consumption of infected food and water
Micrococcus melitensis	,, and goats	Undulant fever; *syns.* Malta fever, Mediterranean fever, Remittent fever	[Flies]. Although the main channel of infection is the consumption of goat's milk
Diplococcus intracellularis	Man	Cerebrospinal fever	Flies?
,, *pemphigi contagiosi*	,,	Tropical impetigo	[Lice]

Table II.

Notes to Table III.—Diseases of Spirochætal Origin.

With these diseases the usual method of transmission is *direct*—that is to say, through the bites of the insect vectors.

The more important Insect-borne Diseases of Spirochætal Origin.

N.B.—Names between square brackets = certain vectors; names without square brackets = probable vectors; names followed by ? = possible vectors.

The word "flies" includes in the main:—*Musca domestica*, *Fannia* sps., *Calliphora* sps., *Lucilia* sps., and *Sarcophaga* sps.

Organism	Host	Disease	Vector
Spirochæta carteri	Man	Indian relapsing fever	[Lice]
,, *duttoni*	,,	African ,, ,, (Tick fever)	[Ticks (*O. moubata, O. savigny*)]
,, *gallinarum*	Fowls	Spirochætosis	[*Argas persicus*]
,, *novyi*	Man	American relapsing fever	[Lice]
,, *pertenuis*	,,	Yaws (Frambœsia)	Flies?
,, *recurrentis*	,,	European relapsing fever	[Lice]. Bed-bugs?
,, *berbera*	,,	North African relapsing fever	[Lice]

Table III.

Exceptions occur in the case of relapsing fever transmitted indirectly by lice, and yaws where *Musca domestica* may at times convey the organism from diseased to healthy persons.

Notes to Table IV.—Diseases of Protozoal Origin.

Both *direct* and *indirect* methods of transmission by insects occur with diseases of this class. With the intestinal parasites indirect transmission takes place by the flies feeding on fæces containing the resistant stages (cysts), and later depositing them on human food and drinking water either by regurgitation of the stomach contents, or more often *per anum*, as Wenyon and O'Connor have shown recently.[1] Needless to say, infection also occurs—and perhaps principally—by mechanical and aerial transmission of the cysts to food and water.

The majority of the protozoal blood parasites have insect vectors, on which they depend solely for transmission, and in certain cases these vectors are specific: Malaria, *Anophelines;* sleeping sickness, *Glossinæ;* European relapsing fever, *Pediculi*. Other insect-borne blood parasites are apparently able to be transmitted by more than one vector, i.e., Kala-azar, bed-bug (Patton); kala-azar, *Triatoma rubofasciatus* (Donovan); Souma (*Trypanosomiasis*), *Glossinæ;* Souma (*Stomoxys calcitrans*).

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[1] "The Carriage of Cysts of *Entamœba histolytica* and other protozoa, and eggs of Parasitic Worms by House flies, with some Notes on the Resistance of Cysts to Disinfectants and other Agents." C. M. Wenyon and F. W. O'Connor, *Journal of the Royal Army Medical Corps*, May, 1917, p. 522.

THE MORE IMPORTANT INSECT-BORNE DISEASES OF PROTOZOAL ORIGIN.

N.B.—Names between square brackets = certain vectors; names without square brackets = probable vectors; names followed by ? = possible vectors.)

The word "flies" includes in the main: *Musca domestica*, *Fannia* sps., *Calliphora* sps., *Lucilia* sps., and *Sarcophaga* sps.).

Organism	Host	Disease	Vector
Entamœba histolytica	Man	Amœbic dysentery	[Flies]
*Lamblia intestinalis**	,,	Flagellate ,,	[Flies]
Plasmodium malariæ	,,	Quartan malaria	[Anopheline mosquitoes]
,, *vivax*	,,	Benign tertian malaria	[Anopheline mosquitoes]
,, *falciparum*	,,	Malignant or subtertian malaria	[Anopheline mosquitoes]
Leishmania tropica	,,	Oriental sore	Flies? Fleas? Phlebotomus? Hippobosca?
,, *donovani*	,,	Kala-azar	Bed-bugs? Fleas? Triatoma?
,, *sp. incerta*	,,	Espundia	Probably some tropical blood-sucking insect
,, *infantum*	Children	Leishmaniasis	Fleas?
Trypanosoma gambiense	Man	Sleeping sickness	[*Glossina palpalis* (Tsetse flies)]
,, *rhodesiense*	,,	,, ,,	[*Glossina morsitans*] ,, ,,
,, *brucei*	Cattle and horses	Fly sickness (Nagana)	[*Glossina morsitans*] ,, ,,
,, *lewisi*	Rats	Rat trypanosomiasis	Rat louse? and [Rat fleas (*Ceratophyllus fasciatus*), *Ctenocephalus canis*]
,, *evansi*	Horses, mules, camels	Surra	[Horse flies (Tabanidæ, *Tabanus striatus*]
Schizotrypanum cruzi	Man	Chaga's disease	[*Triatoma* (Conorhinus) *megistus*]
Babesia bigeminum	Cattle	Red-water fever	[Ticks (*Margaropus annulatus*)]
,, *ovis*	Sheep	Piroplasmosis	[Ticks (*Rhipicephalus bursa*)]
,, *canis*	Dogs	Malignant jaundice	[Ticks (*Rhipicephalus sanguineus* and *Hæmaphysalis leachi*]
,, *caballi*	Horses and mules	Piroplasmosis	[Ticks (*Dermacentor reticulatus*)]
Nuttallia equi	,, ,,	,,	[Ticks (*Rhipicephalus evertsi*)]
? Chlamydozoa ?	Man	Ophthalmia ægyptica and other ophthalmic conditions	[Flies]

* By some authorities *Lamblia intestinalis* is not regarded as pathogenic.

TABLE IV.

NOTES TO TABLE V.—DISEASES OF HELMINTHAL ORIGIN.

With the exception of possible infection with certain helminths, resulting from the carriage by flies of helminth ova from fæces and subsequent deposition of the ova on food, the insect-borne helminths all undergo part of their life-history in the body of the insect vector. Thus the adult *Filaria bancrofti* live in human lymphatic glands. The ova find their way into the blood-stream, where they hatch to the Microfilariæ, and some are taken up from the blood when a mosquito bites a person harbouring the organisms. These, if they have entered the stomach of *Culex fatigans*, or other intermediate host, soon make their way to the thoracic muscles of the mosquito, where they undergo definite metamorphosis. When this is complete (usually in from sixteen to twenty days) the worms make their way into the mosquito's proboscis, and when next it pierces the skin of some victim the filariæ burst through the proboscis sheath and make their own passage through the skin, from which they soon travel to some lymphatic gland, where they become sexually mature, and the cycle is repeated. Similarly, *Dipylidium caninum* passes part of its life-history in the rat flea, and becomes sexually mature in the dog or man. The ova are ingested by the larval flea, and infection by the cysticercoid stage follows the accidental ingestion of the flea by the definite host.

THE MORE IMPORTANT INSECT-BORNE DISEASES OF HELMINTH ORIGIN.

N.B.—Names between square brackets = certain vectors.

The word "flies" includes in the main: *Musca domestica*, *Fannia* sps., *Calliphora* sps., *Lucilia* sps., and *Sarcophaga* sps.

Organism	Host	Disease	Vector
Dipylidium caninum	Man and dogs	Tæniasis (tapeworm)	[Dog louse (*Trichodectes latus*)]; [Dog flea (*Ctenocephalus canis*)]; and the [Human flea (*Pulex irritans*)]
Ova of certain helminths	Man	Helminthiasis (parasitic worms)	[Flies]
Microfilaria bancrofti	,,	Filariasis (Elephantiasis)	[Mosquitoes (*Culex* and *Anopheles* sps.)]
Loa loa	,,	Calabar swellings	[Horse flies) *Chrysops dimidiata* and *Chrysops silacea*)]
Filaria immitis	Dogs	Dog filariasis	[Mosquites (*Culex* and *Anopheles* sp.)]
Hymenolepis diminuta	Rats, and occasionally man	Tæniasis	[Fleas]

TABLE V.

NOTES TO TABLE VI.—DISEASES DIRECTLY ATTRIBUTABLE TO INSECTS AND ACARINA.

In each case the disease results from the damage done by the insects and acarina in adopting existence upon the body of the host and living upon its tissues. The time spent upon the host may cover the whole life-history of the parasite and many subsequent generations, as with *Sarcoptes scabiei* and the *Pediculi*, or it may only embrace part of the parasite's development, as with the larvæ of flies causing myiasis. In either case the injury to the host may be so extensive as to cause death from the loss of vital tissue, or the injury itself, although insignificant, may indirectly cause death to the host by providing a suitable path for invasion by pathogenic micro-organisms.

THE MORE IMPORTANT DISEASES DIRECTLY ATTRIBUTABLE TO INSECTS AND ACARINA.

N.B.—Name between square brackets = certain vector.

Organism	Host	Disease	Vector
The larvæ of *Fannia canicularis*	Man	Intestinal myiasis	—
,, ,, *Piophila casei*	,,	,, ,,	—
,, ,, *Eristalis tenax*	,,	,, ,,	—
,, ,, *Muscina stabulans*	,,	,, ,,	—
,, ,, *Sarcophaga* sps.	,,	Intestinal, dermal and muscular myiasis	—
,, ,, *Lucilia* sps.	,,	,, ,, ,, ,, ,,	—
,, ,, *Calliphora* sps.	,,	,, ,, ,, ,, ,,	—
,, ,, *Chrysomyia macellaria* (the Screw worm)	,, and animals	Nasal, auricular, and dermal myiasis	—
,, ,, *Cordylobia anthropophaga* (the Tumbu fly)	Man	Dermal myiasis	—
,, ,, *Dermatobia hominis*	,,	,, ,,	—
,, ,, ,, ,,	,,	,, ,,	[Mosquito (*Janthinosoma lutzii*)]
,, ,, *Hypoderma bovis*, &c.	Cattle (occasionally man)	,, ,, (Creeping disease in man)	—
,, ,, *Œstrus ovis*	Sheep (rarely man)	Nasal myiasis	—
,, ,, *Gastrophilus equi*, &c.	Horses	Gastric myiasis	—
,, ,, *Trombidiidæ* (Harvest mites)	Man	Severe cutaneous irritation	—
Pediculoides ventricosus	,,	Dermatitis	—
Tyroglyphus siro	,,	,, (the so-called "vanillism")	—
Other *Tyroglyphidæ*	,,	,, (Grocers' itch)	—
Tyroglyphus longior castellani	,,	Copra itch	—
Sarcoptes scabiei	,, and animals	"Itch" or "scabies"	—
Pediculus capitis	Man	Pediculosis of the head	—
,, *humanus*	,,	,, ,, body	—
Phthirius pubis	,,	,, ,, axillary and pubic regions	—
Dermatophilius penetrans (Chiggers)	,, and animals	Severe cutaneous irritation	—

THE MORE IMPORTANT INSECT-BORNE DISEASES OF FUNGUS ORIGIN.

N.B.—Name between square brackets = certain vector.

Organism	Host	Disease	Vector
Achorion schonleinii	Man	Favus	[Lice (Pediculi)]

TABLE VI.

CONCLUSION.

It should be borne in mind that a large number of diseases included in the foregoing tables are not confined to being spread by insects, and insect transmission may in some cases only be occasional. This fact, however, cannot afford the preclusion of such diseases from consideration, and where transmission of the indirect type is possible, it is obvious that we are unable to form any just estimate of its relative importance. Probably, nevertheless, the dissemination of pathogenic micro-organisms by flies, for all that has lately been said in this connection, has not even yet been over-emphasized. It seems more than likely that *Bacillus tuberculosis* is spread in this manner from infective sputum to food (milk particularly) to a much greater extent than is commonly imagined, and there being no probability of rapid acute infection, as with *B. typhosus*, the part played by the fly is too apt to be overlooked.

Much of our knowledge with regard to insects and disease is still indefinite, as may be seen from the tables, but to anyone not particularly conversant with the subject, what we already know with certainty, even in connection with only the more important diseases that have been considered, may be sufficient to cause some little surprise.

NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.

By Lieutenant-Colonel ALDO CASTELLANI, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

(Continued from p. 202.)

INTESTINAL WORMS.

Anchylostomiasis is met with in the Balkans, but is rarer than I expected. I saw two cases in boys at the American Clinique in Skoplje in 1915. Both were due to *Anchylostoma duodenale* Dubini 1843. So far I have not seen cases among the soldiers.

Ascaris lumbricoides L. 1758 is quite common among children and adults, and so is *Oxyuris vermicularis* L. 1767, and *Trichuris trichiura* L. 1761.

I have seen a case of *Anguillulosis* due to *Strongyloides stercoralis* Bavay 1877. The patient, a Macedonian woman, was suffering from chronic diarrhœa without any blood and mucus in the stools; her general condition of health was rather poor, and she was very anæmic. The number of anguillulæ in the stools was simply enormous; no eggs of other worms; a few flagellates, *T. hominis* Davaine 1854, were present.

Tæniasis seems to be rather frequent; most cases were due to *T. saginata* Goeze 1782, a few to *T. solium* Linnæus 1758, one to *Hymenolepis nana* von Siebold 1852 (*T. nana*). The last case was in a Macedonian boy.

Gastro-intestinal Myiasis.—A Serbian soldier, 32 years of age, came to the Skoplje Clinic complaining of attacks now and then of severe abdominal pains and diarrhœa. He was given castor oil, and the stools were collected in a sterile vessel, and were found to be liquid, brownish without blood or muco-pus; they contained several white, rather large larvæ, the further investigation of which could not be carried out. He was repeatedly purged and given ext. filicis three times, with apparently good results, as no more larvæ were found in the fæces.

Filariasis and Elephantiasis.

In August, 1915, in Skoplje, and in 1916 near Monastir, I have seen two cases of acute lymphadenitis with erythematous rash and great enlargement of the left leg in both cases. In the Skoplje case the blood taken at night was seen to contain *Microfilaria bancrofti* on two occasions. I have seen also in Macedonia three cases of typical elephantiasis of the leg, and one in Naples.

Endemic Funiculitis.

A typical case, which had been taken for strangulated hernia, was seen by me in consultation in Macedonia in 1915. The patient—a young man of about 25—after a long march, was suddenly taken ill with a shivering fit, vomiting and high fever, and complained of very severe pain along the cord and epididymis. The temperature on admission to the Serbian Hospital—fourteen hours after onset of symptoms—was 102° F., the pulse very small and frequent. The inguinal region was occupied by a large cylindrical swelling in the direction of the cord, hard and very tender. The officer who admitted him made a diagnosis of strangulated hernia, but as he thought the patient might also be suffering from malaria, he asked me to see him. Having seen so many cases in Ceylon, I had no difficulty in making a diagnosis of endemic funiculitis. Not only the cord, but the epididymis was slightly enlarged and painful. An operation was performed—orchotomy with section of the inflamed cord as high as possible. The affected spermatic cord was highly inflamed and infiltrated, its circumference measuring 3½ in.; creamy yellow pus was exuding from the opened veins of the pampiniform plexus, as well as from the vas deferens. The epididymis was slightly infiltrated, but there was no pus. The testicle proper was quite normal, while the tunica vaginalis contained a very slight amount of clear fluid. More details on this condition, which was first described by me in Ceylon, may be found in my old papers, as well as in those by Coutts, and an account of the condition is given in the "Manual of Tropical Medicine" by Chalmers and myself, p. 1429.

Diseases of the Respiratory System.

I would call attention to two tropical diseases of the respiratory system which are not rare in the Balcanic zones, viz., broncho-spirochætosis and broncho-mycosis. These two maladies are of great practical importance, as soldiers suffering from them are generally considered to be tubercular cases and are discharged from the Army, while an appropriate treatment may cure the majority of patients.

Broncho-spirochætosis.

This condition, which was described by me in Ceylon in 1905 and 1906, is not rare in the Balkans. It is due to a spirochæte which I found in 1905, and named in 1907 *S. bronchialis*. This organism has been recently completely investigated in a masterly manner by Professor Fantham (*Annals of Parasitology*, July, 1915), and much valuable work has been done on the malady by Branch, Jackson, Chalmers and O'Farrell (important publication), Chamberlain, Harper, Lurie, Macfie, Taylor, and others. Galli Valerio has been the first to record the disease in Europe (Switzerland); his latest very valuable publication will be found in the *Correspondenzblatt für Schweizer-Aertze*, February, 1917. As I propose to give again soon a detailed account of the malady elsewhere,[1] I will limit myself here to say a few words on its clinical aspect and treatment.

I distinguish three types of the malady: the acute type, the chronic type, the subacute type.

In the *acute type* the patient feels chilly and develops fever, which generally is not very high, rarely exceeding 103° F., and lasts between four and six days. The patient coughs a great deal, and may have rheumatoid pains all over the body. The expectoration is scanty, muco-purulent. In some cases the general condition of the patient is not much affected; in others the patient feels very tired and ill. At times the affection starts with symptoms of acute rhino-pharyngitis like an ordinary cold.

In the *chronic type* the onset is often insidious and very slow, though at times it may follow an acute attack. There is cough with muco-purulent expectoration, at times abundant, at times scanty. The sputum may be slightly bloody, and occasionally hæmoptysis takes place, some pure blood being brought up. The temperature may be normal or of a hectic type; in a case in the Balkans the temperature showed a peculiar undulating type.

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[1] *Presse Médicale*, No. 37, 1917.

The physical examination of the chest reveals in some cases very little except perhaps a few râles; in other cases signs of consolidation may be present, and the diagnosis from tuberculosis on clinical signs may be almost impossible. The general condition may remain good for a long time; occasionally, however, the patient wastes rapidly. The course may extend to several years, with periods of great improvement and even apparent cure. Between the acute and chronic cases there is an intermediate group of subacute cases.

The *diagnosis* is based on the microscopical examination of the sputum. The patient should gargle with sterile water before expectorating.

As regards *treatment*, arsenic, first introduced by me in the treatment of the malady, is often efficacious. It may be administered as liq. Fowleri, pills of ac. arseniosi, &c. When the expectoration is profuse, glycerophosphates and balsamics are useful. Recently I have used in certain cases with good results tartar emetic or a combined arsenical tartar emetic treatment. The following formulæ will be found useful:—

(1)	Tartar emetic	gr. v
	Sodii bicarb.	gr. xxx
	Glycerine...	ʒi
	Aq. chlorof.	℥i
	Aq. ad	℥iii

Sig., ʒi t.d. diluted in water.

(2)	Tartar emetic	gr. $\frac{1}{6}$—$\frac{1}{4}$
	Codein	gr. $\frac{1}{6}$—$\frac{1}{4}$
	Syr. tolu	ʒi
	Aq. chlorof. ad	℥i

℥i t.d. diluted in water.

(3)	Tartar emetic	gr. $\frac{1}{6}$—$\frac{1}{4}$
	Potass. iodid.	gr. v
	Sodii bicarb.	gr. x
	Glycerine	ʒi
	Syr. tolu	ʒi
	Aq. chlorof. ad	℥i

℥i t.d. diluted in water.

(4)	Liq. arsenicalis	♏ii—iii
	Tartar emetic	gr. $\frac{1}{6}$—$\frac{1}{4}$
	Glycerine	ʒi
	Syr. tolu	ʒi
	Aq. chlorof. ad	℥i

℥i t.d. diluted in water.

Bronchomycosis.

The commonest forms of bronchomycosis met with in the Adriatic and Balcanic zones are bronchomoniliasis, broncho-oïdiosis, broncho-hemisporosis.

In addition I have seen a case of bronchomucormycosis, one of aspergillosis, one of penicilliosis, and one of nocardiasis. I propose giving a full account of the three common types in another publication.[1] I will limit myself to state here that, whatever the etiology, the clinical symptoms are very similar. A mild type and a severe type may be distinguished with of course a number of inter-

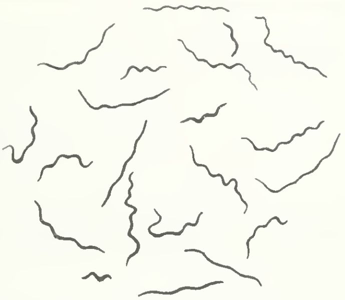

Fig. 1.
S. bronchialis, Cast., found in broncho-spirochætosis and also in certain cases of acute rhino-pharyngitis.

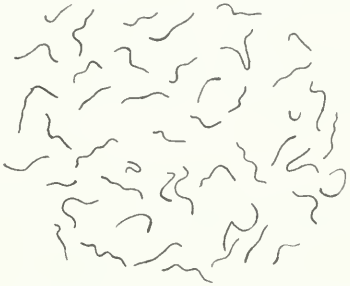

Fig. 2.
Spirochætes found in certain cases of rhino-pharyngitis.

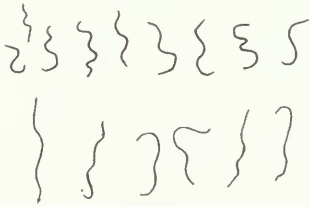

Fig. 3.
Spirochætes from the urine of a case of "camp-jaundice" (very mild type)

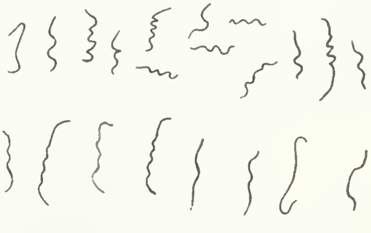

Fig. 4.
Spirochætes from the urine of a case of icterus castrensis gravis.

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[1] *Presse Médicale*, No. 37, 1917.

CULTURAL AND BIOCHEMICAL CHARACTERS OF CERTAIN SPECIES OF THE GENUS MONILIA PARSOON 1797.

	Litmus milk	Glucose	Lævulose	Maltose	Galactose	Saccharose	Lactose	Mannite	Dulcite	Dextrin	Raffinose	Arabinose	Adonite	Inulin	Sorbite	Indol	Gram	Gelatine	Serum	Neutral red	Glucose agar cultures	Remarks
Monilia albicans, Robin.	AC	AG	AGs	AGs	AG	Avs	O	O	O	O	O	O	O	O	O	O	+	+	+s	O	white	
Monilia balcanica, Cast.	O	A or AG	O or A	O	O	O	O	O	O	O	O	O or As	O	O	O	O	+	O	O	O	white	
Monilia blanchardi, Cast.	Avs/Alk	AGs	A	A	A	A	O	O	O	O	As	O	O	Avs	O	O	+	O	O	O	white	
Monilia bronchialis, Cast. ...	O	AG	AG	AG	O	AGs	O	O	O	A	O	O	O	O	O	O	+	O	O	O	white	
Monilia burgessi, Cast.	O/Alk	AGs	A	AGs	A	AGs	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	
Monilia chalmersi, Cast.	As/Alk	AG	AG	As	AGs	AG	O	O	O	O	As	O	O	AGs	O	O	+	O	O	O	white	
Monilia decolorans, Cast. and Low	DFC	AGs	AG	AGs	A	A	O	O	O	A	O	O	O	O	O	O	+	O	O	O	white	
Monilia enterica, Cast.	O/Alk	AG	AG	AG	AG	AG	O	A	O	A	O	O	O	O	O	O	+	O	O	O	white	
Monilia fæcalis, Cast.	A/CDPs	AG	AG	AG	A or AGs	A or AGs	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	Occasionally laevulose A only
Monilia guillermondi, Cast. ...	O/Alk	AG	AG	As	A	AG	O	O	O	O	AGs	O	O	O	O	O	+	O	O	O	brownish	
Monilia insolita, Cast.	As/Alk	AG	AG	AG	AG	AG	O	As	O	O	O	O	O	O	O	O	+	O	O	O	white	
Monilia intestinalis, Cast. ...	O or ADs	AG	AG	O or As	A	A	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	Certain strains saccharose O
Monilia krusei, Cast.	OAs	AG	AG	O	O	O	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	At times raffinose As
Monilia lustigi, Cast.	As/D	A	AGs	Avs	A	AGs	O	O	O	A	AGs	O	O	O	O	O	+	O	O	O	white	
Monilia negrii, Cast.	Avs/Alk	AG	AG	As	AGs	AG	O	O	O	O	AGs	O	O	O	O	O	+	O	O	O	white	
Monilia nivea, Cast.	O/Alk	AG	AG	AG	AG	AG	O	O	O	O	AG	O	O	O	O	O	+	O	O	O	white	The fermentation of raffinose is not constant
Monilia nitida, Cast.	A/DC	AG	AG	A	A	A	A	A	O	Avs	As or O	O	O	O	O	O	+	O	O	O	white	
Monilia paratropicalis, Cast. ...	As/Alk	AG	AG	AG	AG	AG	O	O	O	A	O	O	O	O	O	O	+	O	O	O	white	
Monilia perryi, Cast.	As/D Alk	A	AGs	A	A	AGs	O	O	O	O	As	O	O	Avs	O	O	+	O	O	O	white	
Monilia pinoyi, Cast.	O	AG	AG	AG	O	O	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	
Monilia pseudotropicalis, Cast. ...	ACs	AG	AG	O	AGs	AG	AG	O	O	O	O	O	O	O	O	O	+	O	O	O	white	Coagulation of milk only partial and very slow
Monilia pulmonalis, Cast. ...	O/Alk D	AG	AG	AG	AGs	AG	O	Avs	O	O	A	AGs	O	O	O	O	+	O	O	O	white	
Monilia rhoi, Cast.	As/Alk	AG	AG	Avs	AGs	AG	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	
Monilia tropicalis, Cast.	O or A	AG	AG	AG	AGs	AGs	O	O	O	O	O	O	O	O	O	O	+	O	O	O	white	The fermentation of saccharose is not constant with certain strains
Monilia zeylanica, Cast.	ACS	A	A	A	A	A	As	O	O	A	Avs Gvs	O	O	Av	O	O	+	O	O	O	yellowish	

CULTURAL AND BIOCHEMICAL CHARACTERS OF CERTAIN SPECIES OF THE GENUS OIDIUM LINK 1809.

Oidium album, Cast. 1915 ...	AC	AG	AG	AG	AG	A	O	O	O	O	O	O	O	O	O	O	O	O	O	...	white	
Oidium asteroides, Cast. 1914 ...	AC	A	A	A	A	A	A	O or Avs	O	O	O or Avs	O or As	O	O	...	O	O	+	O	...	whitish-yellowish and amber colour	Isolated colonies have often a radiating appearance
Oidium lactis, Link 1909 ...	AC	O or As	O	O	O	O	O	O	O	O	O	O	O	O	...	O	O	O	O	...	white	
Oidium matalense, Cast. 1915 ...	O or As	O or A	O or A	As	O or Avs	O or As	O	O	O or As	...	O	O or A	O or As	O or Avs	...	O	O	O	O	...	white	
Oidium rotundatum, Cast. 1911 ...	A or AC	As	A	O or As	As	O	O or Avs	O or As	O	...	O	O or A	...	O	...	O	O	+	O	...	yellowish	Surface of cultures often has a crinkled appearance

Abbreviations used in the tables:—

A—acid ; G—gas ; C—clot (milk), clear (broth and peptone water) ; CTP—clear at first, then thin pellicle present. D—decolorized. P—peptonized (milk), pellicle (broth). Alk—alkaline. $\frac{A}{Alk}$—acid, then alkaline. s—slight ; vs—very slight. O—negative result, viz., neither acid nor clot in milk ; neither acid nor gas in sugar media ; non-production of indol ; non-liquefaction of gelatine or serum, as the case may be. +—positive result, liquefaction of medium. F—fine.

diate cases. In the mild type the general condition of the patient is good, there is no fever, and he simply complains of cough. The expectoration is muco-purulent, often scanty, and does not contain blood. The physical examination of the chest is negative or reveals only a few râles. The condition may last for several weeks or months, and may get cured spontaneously, or continuing, may turn into the severe type.

The *severe type* closely resembles phthisis. The patient becomes emaciated, there is hectic fever, and the expectoration is often bloody. The physical examination of the chest may show patches of dullness, fine crepitations, pleural rubbing. This type may be fatal.

The diagnosis is made by mycological cultural methods, an account of which is given in the *Manual of Tropical Medicine* by Castellani and Chalmers, p. 1286. Cases of mixed infection, broncho-mycosis + tuberculosis, broncho-mycosis + spirochætosis, are occasionally observed.

The treatment consists in giving potassium iodide to which glycerophosphates and balsamics may be associated. It is interesting to note that in certain cases potassium iodide has practically no beneficial action whatever.

Broncho-mucormycosis.

A Serbian soldier was sent to me with the diagnosis of T.B. He was very anæmic, very weak, and was losing flesh rapidly; slight fever at night. Sputum muco-purulent.

The examination of the chest revealed nothing except a few coarse râles. Examination of sputum for T.B. constantly negative; instead, a few mycelial segments were noticed on several occasions. Glucose agar tubes and other media were inoculated and a fungus was isolated, which at first showed cultural characters somewhat monilia-like; in subcultures, however, the characters of a mucor appeared; a yellowish ovoid-shaped "columella," sporangium globular about 50 microns in diameter of yellowish colour, spores elliptical, smooth.

How did the patient get infected? It is interesting to note that he was in charge of horses and had to remove often the horse dung. As is well known, *Mucor mucedo* L. is extremely common in horse dung.

Bronchial Aspergillosis.

I have seen several cases of this condition in the Tropics—a case in an island in the Adriatic, another in Macedonia. These two cases had been diagnosed as T.B.; from one *Aspergillus fumigatus* Fresenius was grown; from the Macedonian case a fungus very similar or identical with *Sterigmatocystis nigra* Cramer was isolated.

Bronchial Penicilliosis.

A Serbian soldier was sent to me with the diagnosis of T.B. He was wasting and had serotine fever. Expectoration muco-purulent, occasionally bloody. Examination for T.B. constantly negative.

A few mycelial threads present. A fungus was grown with the characters of *Penicillium crustatum* L. Potassium iodide acted satisfactorily.

Bronchial Nocardiasis.

In the Balkans I have observed one case of this condition, in the Tropics several. The case seen in the Balkans was a young Serbian with all the symptoms of tuberculosis of the lungs; great loss of flesh, serotine fever, bloody expectoration; the physical examination of the chest showed patches of consolidation, crepitations, and pleural rubbing. The sputum contained at times some very small, whitish granules composed of very thin branching filaments, Gram-positive, and partially acid-fast. The fungus was easily grown on maltose and glucose agar, and in subcultures also on ordinary agar. The cultures had at times a pink-reddish colour. Gelatine was liquefied. No treatment was of any avail.

Rhino-pharyngitis Spirochætica.

Certain cases of broncho-spirochætosis are preceded by symptoms of acute or subacute nasopharyngitis (coryza), and in the nasal and pharyngeal secretion of such cases as I noted long ago *S. bronchialis* may be found. In addition to these cases of spirochætal rhino-pharyngitis due to *S. bronchialis*, there are others in which spirochætes are found morphologically different from *S. bronchialis.*

In several cases of rhino-pharyngitis, clinically showing symptoms of an ordinary coryza, with sneezing, sero-mucous discharge, slight headache, I have found in the nasal and pharyngeal secretion a large number of spirochætes. At the very beginning of the attack the spirochætes are practically the only germs present; later various bacteria are found in large numbers. In two cases symptoms of bronchitis developed, and in the bronchial secretion, too, the same type of spirochæte was found; it appears, therefore, that there is more than one type of broncho-spirochætosis and of spirochætic rhino-pharyngitis. The spirochæte found, similar or identical with *S. minuta* Cast., though very delicate, can be put in evidence by staining with Jenner's and other modifications of Romanowski's staining. It stains often pinkish-reddish, and morphologically differs from *S. bronchialis* and most of the usual spirochætes, the spirals being generally very few. Its length varies from 3 to 10 and 12 and more microns. The beginner should be careful not to take for spirochætes the undulating fibrin threads, particles of detached ciliated epithelium and detached cilia.

DISEASES OF THE URO-GENITAL ORGANS.

I have seen a case of *elephantiasis of the scrotum* in a Macedonian peasant. I have observed two cases of non-gonorrhœal urethritis. The commonest forms of non-gonorrhœal urethritis I have seen in the Tropics may be classified as follows:—

(I) *Traumatic mucous urethritis* due to violent and long continued physical exercise. One is rather sceptical in admitting such a type of urethritis, and I well remember that practically all the cases of so-called "porters' urethritis" I saw in Equatorial Africa were gonorrhœal infections. Still, there can be little doubt that in soldiers and native porters doing long marches day after day a slight urethritis with scanty mucous discharge may occasionally develop in individuals who have never suffered in the past from gonorrhœa. The secretion in my experience is never frankly purulent.

(II) *Urethritis of Hyphomycetic Origin.*—The following clinical varieties may be differentiated:—

(1) The discharge is black, greenish-black, or brownish-black. Generally due to fungi of the genus *Aspergillus* Micheli.

(2) Discharge, white or yellowish. Generally fungi of the genus *Monilia* Persoon and of the genus *Oidium* Link are found.

(3) Red discharge. Generally due to a red pigmented monilia or to a non-pigmented monilia + red pigmented bacilli or cocci.

(III) *Urethritis of Protozoal Origin.*—The following varieties:—

(IV) *Flagellate Urethritis.*—The flagellates found belong to the genera *Trichomonas* Donné, *Cercomonas* Dujardin, *Prowazekia* Hartmann and Chagas. In one of my cases a flagellate with four flagelli was found.

(V) *Amœbic Urethritis.*—I have seen in the Tropics three cases of purulent urethritis due probably to amœbæ which were present in large numbers. In one case the amœba present was of very small size; in the other two the organism was very much like *E. histolytica* Schaudinn.

(VI) *Spirochætic Urethritis.*—Spirochætic urethritis has been recently described by Macfie in some interesting publications. I have seen a case in Macedonia.

(VII) *Treponema Urethritis.*—Some years ago a planter in Ceylon came to consult me for what he considered to be gonorrhœa, though according to his statements he had never had sexual intercourse with any woman. The discharge was mucopurulent; rather scanty. Gonococcus negative. In preparations stained with Giemsa's modification of Romanowski's method very numerous treponemata were present. The organism was very delicate, stained purplish or pinkish; numerous small spirals all practically of the same size; length of the parasite 6 to 12 microns. No history and no sign whatever of syphilitic infection. Urethral irrigations of a 1 in 20,000 solution of hyd. perchl. cured the condition.

It is to be noted that all the organisms I have mentioned may be found occasionally in the vaginal secretion, especially of native women, in whom vaginitis due to the same organisms is not very rare. It is possible, therefore, that a certain number of cases of hyphomycetic and protozoal urethritis are contracted in reality by sexual intercourse.

(*To be continued.*)

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 15, 1917.

LIMITATIONS IN PRESCRIBING OWING TO SCARCITY OF CERTAIN MEDICINES.

WE receive directions from time to time that certain preparations in the Pharmacopœia are unobtainable, and that with others they are to be used only in cases of necessity.

When one looks over the long lists of preparations in our armamentarium, one wonders who prescribes the seemingly out-of-the-way drugs or uses the newer remedies which keep constantly cropping up and invading the field of the more "legitimate" medicines in common use.

Most medical men find their range of prescribing narrows down until their selection is confined to a very few drugs indeed; and these will be found to be the standard remedies which have been used for many decades or even centuries. The reason for this limitation may be due to several causes. One may be that the more recent additions have been found wanting, that most of the physiologically tested drugs have proved clinically disappointing, and that the synthetical compounds of the laboratories, imitations of natural products, have not fulfilled expectation.

Yet another reason may be the unreceptivity of the mind of the older men, who cannot follow the well-nigh daily additions to the drugs they had become familiar with in their youth.

Experiences of changes in practice to the man with, say, fifty years to his record have lost their significance. He has seen this and that preparation brought in with a flourish, only to fizzle out into absolute neglect. He has seen well-established principles of practice invaded and condemned, only to be re-established after an ephemeral so-called success of the new "scientific" measure. In surgery, as in medicine, fashions prevail, and the "infallible" benefits conferred upon humanity by this and that operation, antiseptic, or plan of manipulation, develop, mature and decay as if they had never been. No wonder, therefore, that the minds of old practitioners become "unreceptive"; it is rather a question of "unresponsiveness" to changes of which they had had so many experiences of failure that lessens their interest in the products of the laboratory which form the majority of these comets of practice.

Not only are the newer remedies looked at askance as the result of experience, but many even of the drugs, which as young men they used when starting practice, have been eliminated from their prescriptions.

In reports handed down to us this phase of practice is constantly brought before us. This and that famous physician believed only in mercury and black draught, or in arsenic and castor oil, or in some such narrowly limited range of treatment. Of course this is an exaggeration, but it has the elements of truth in it no doubt. The late Dr. Jephson, who practised in Leamington, is said to have had two prescriptions: for all fevers and feverishness attacks he gave Warburg's tincture, and for other ailments guaiacum resin and sulphur (the "Chelsea pensioner" of to-day), yet Dr. Jephson had the largest practice in Britain in his day, and died, although but only some fifteen years in practice, worth over £400,000, the richest British practitioner who ever lived. The legend may or may not be even approximately accurate, but it is a legend which has well-founded stability, and repeats the tale of the narrowness of the field of choice followed by men of great experience and undoubted ability as practitioners.

Warburg's tincture, it may be said, however, is a compound which is anything but a "simple," for there were no fewer than twenty-three drugs in the compound before Warburg of Vienna added quinine to the old Asiatic remedy for "fever," which was in use in the time of Mithridates—that is, 2,000 years ago, before the foundation of the Christian era. Polypharmacy was a feature of our predecessors prevailing in the time of our grandfathers or even our fathers; but the drugs used were few, as a rule, and the same drugs figured frequently in almost all prescriptions. It may be said that to-day our prescriptions are much more simple, one drug one disease being seemingly the aim of modern prescribers, a "catching" form of treatment no doubt, and one favoured greatly by the tabloid and tablet forms of pharmacy now in vogue. It is a revolt against the polypharmacy of our fathers' time, but like most revolutions it has led to extremes, which, as common sense is brought to bear upon them, have not stood the test of experience or, in other words, of the interpreter of experience, viz., science. That each disease has its specific drug is a "dock and nettle" theory which never can stand. Recent knowledge shows that certain remedies may drive parasites from the blood to the surrounding tissues, where they only await the disappearance of the drug from the blood for the parasites to return to the blood. They took shelter in the surrounding tissues for a time unscathed, but their destruction can only be fulfilled by a drug which tackled the parasite whilst it was outside the blood-vessels. A good example of the kind is found in the case of sleeping sickness; antimony injections cause the disappearance of the trypanosomes from the blood, but it requires mercury to be administered to destroy them in their new positions whilst outside the vessel's walls. The spirillum of syphilis disappears under salvarsan, but that does not cure, and it is gradually dawning upon us that a subsequent course of mercury is required in the attempt to eliminate this infection. Emetine, again, relieves the symptoms and causes the disappearance of the amœbæ of acute dysentery, but a subsequent course of ipecacuanha is recommended by men of experience in order to get rid of the subsequent colitis. Malaria and quinine would seem to prove the one drug one disease, inasmuch as quinine is both a prophylactic and a cure of malaria. But is it? No one, who is not blinded by the prejudice of custom and paralysed by use and wont, believes this to-day. Our fathers gave quinine, arsenic, opium, and mercury in the treatment of malaria, and we are gradually being forced to confess that they were right.

The causes of the limitations placed upon our range of drugs in prescribing is due to certain substitutes impossible to obtain owing to war requirements; this no doubt hampers our prescribing in the routine way we are accustomed to in times of peace; but it is merely the question of a tincture for want of spirit, an ointment or a suppository owing to deficiency in the supply of fats, or of glycerine as an adjuvant in certain compositions. Of the essential drugs the price has risen in some instances, but all are available, and it is but an inconvenience that the prescribed limitations have entailed a modification of the routine prescriptions which come familiarly to our pens, and we are not even called upon to make substitutes in our standard remedies. In China, it fell to the experience of Sir Patrick Manson that quinine was unavailable; he prescribed arsenic and other drugs instead, and found his patients did quite well without the great specific for malaria, now called Warburg's tincture. The old Asiatic mixture had no quinine in it, for the drug was not known until thousands of years after this mixture was used. Yet has this remedy outlived all other known compounds, a proof of its efficacy and its curative properties.

◆

Drug Eruption (S. Lomholt, *Ugeskrift for Læger*, May 3).—A 10 per cent. mercurial salve was applied for two weeks to patches of eczema behind the ears of an 18 months old infant. Then the dermatitis rapidly became universal and severe nephritis developed, with high fever, 20 per thousand albuminuria, dyspnœa, and diarrhœa. The latter was kept up with compound liquorice powder, half a teaspoonful three times a day, given because it contains sulphur. This may combine with the mercurial compounds in the bowel to form an insoluble salt. Sulphur alone would probably have been too heroic for the infant. Improvement gradually followed; the temperature was normal by the tenth day, and recovery then was soon apparently complete.

Symptomless Renal Lithiasis (A. P. Martin, *Siglo Médico*, May 12).—A three-day-old infant, otherwise normal, had passed no urine. A grooved sound in the urethra evacuated a large quantity of "uric sand," forming a paste with a drop or so of urine.

With rectal infusion of a solution of sugar by the drop method next day 5 or 6 grm. of urine was voided containing uric acid crystals. The child nursed well, and within two days was voiding apparently normal urine and continued to increase in weight. The rise in blood pressure, thanks to the injection of the sugar solution, overcame and swept out the uric acid crystals which had evidently been clogging the outlet to one or both kidneys. Some permanent damage may be left when the uric precipitate is extremely abundant as in some of the cases on record. It may be later the nucleus for stones. Röntgenoscopy is showing that latent—that is, symptomless—kidney stones are far from rare, although never suspected until infection becomes installed.

Original Communications.

LOCALIZED GANGRENOUS VACCINIA.

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Contents. — *Introductory — Khartoum Case — Ætiology—Treatment—Remarks—References.*

Introductory.—This is the second short note published in this Journal with reference to *Vaccinial Eruptions*, as seen in the Anglo-Egyptian Sudan.

The first dealt with *Vaccine Lichen*, while the present note confines itself to the consideration of a single case of the very rare condition known as *Localized Gangrenous Vaccinia*, and we publish this because we were unable to find any records detailing the treatment in a similar case, and as our methods met with success, we feel it to be our duty to record our conclusions for the benefit of any other practitioner who may meet with a like condition.

Khartoum Case.—On May 27 of this year a European lady was vaccinated on the inner aspect of the calf of the left leg.

The technique was as follows: The skin was thoroughly cleaned with alcohol and ether, applied by means of pledgets of sterilized wool, then douched with sterile normal saline solution, and wiped dry by means of sterile cotton-wool. Vaccination was performed by means of one of the usual special vaccination knives which had been recently sterilized, and was kept till required in the glass tube, stoppered with cotton-wool, in which it had been sterilized. Four or five scratches were made by means of this knife in one area of about 1 in. in diameter. These scratches did not draw blood.

The vaccine lymph was obtained from the Public Health Department in Cairo, and the outside of the tube containing it was cleaned with sterile cotton-wool dipped in 1 in 20 carbolic acid solution. The ends of the tube were broken off by means of sterile forceps, and the lymph was allowed to drop on to the scarified area, and was then rubbed in by the flat surface of another sterilized knife.

Vaccination was only performed in one area, and the lymph having dried, this was covered by a piece of sterilized lint held in position by a piece of sterilized bandage.

It will thus be seen that no reasonable precaution had been omitted to guard against septicity, and no sign of septic infection appeared at any time during the troubles which followed, and we, therefore, feel certain that the signs and symptoms which we are about to describe were not septic in nature.

During the first three days after vaccination there was nothing to report, but on the third day the area became red and swollen, and on the fourth there was a number of small vesicles.

On the fifth, although there was only slight fever, the patient felt ill, while some of the vesicles ruptured and discharged their contents.

On the sixth day the vaccination area was covered by a yellow crust, and surrounded by a ring of vesicles and by a congested dark red area measuring about 1 in. in diameter. The temperature on this day did not exceed 102° F.

On the seventh day the crusted area became quite black, and extended until it measured some 2 in. in diameter. It was surrounded by a ring of umbilicated vesicles and by a dark red border measuring 1 in. in width, outside of which was a light red area of about the same depth. The whole region felt somewhat brawny to the touch, and the temperature rose to between 104° and 105° F.

On the eighth day the condition of the leg may be described as follows:—

In the centre there lay a black slough some 2 in. in diameter, surrounded by a ring of collapsed vesicles and by a raised dark red border, which, in its turn, was surrounded by a purplish area of skin some 3 in. in width, while, finally, the whole area was defined by a red zone of about an inch in diameter. On this day the temperature did not exceed 103° F., and the patient felt better, though the leg looked worse.

On the ninth day there was a decided improvement, the ring of vesicles had dried and formed a circular scab, the brawny resistance was softer and was beginning to disappear at the edges. The purple hue was lighter and showed signs of becoming reddish in places. The surrounding red area had, however, extended down to the ankle and up to the knee. The temperature did not exceed 102° F.

From this date onwards the signs and symptoms began to steadily improve. The temperature fell slowly, remaining about 101° F. for two days, about 100° F. for another day, and then reached 99° F. The purple area became reddish and the reddish area white.

At this stage an attack of *acute gout* set in, beginning on the thirteenth day, when the temperature, which had never reached normal, rose to 100° F. The gouty symptoms were marked in the left hip, left arm, left side of the jaw, left wrist, the back, and the right ribs. These symptoms lasted some seven days, but gradually gave way to the usual remedies, and the temperature slowly sank to normal.

During this time the slough, mentioned above, came away, and a clean, healthy-looking, healing surface was left at the bottom of a depressed ulcer with raised, but not undermined, red edges, while the surrounding skin had returned to its normal colour.

There were no enlarged lymphatic glands, and no signs of sepsis. The urine was febrile, but did not contain albumin or sugar.

The patient made a good and rapid recovery.

Ætiology.—In attempting to define the causation of the above condition it is important to clearly distinguish between *Localized Gangrenous Vaccinia* and the condition called *Dermatitis Gangrænosa Infantum*, as the latter is a generalized eruption probably of septic origin, following *Varicella* and other pustular eruptions in children, and often assumed to have something to do with vaccination.

Localized Gangrenous Vaccinia, on the other hand, is quite different. It is not septic but vaccinal in origin, and it is not generalized, but localized to the vaccination area.

Acland, Crocker, Balzer, and Hutchinson have met with similar cases, some of which are stated to have ended fatally.

We are much impressed with the fact that, in such cases as we have been able to find any account of, there has been some latent infection or disease in the patient. Thus, for example, in Crocker's case there was *latent scarlet fever*, and in our case there was *latent gout*.

We, therefore, are of the opinion that *Localized Gangrenous Vaccinia* can be produced by perfectly pure calf lymph and by a satisfactory technique in persons suffering from any form of *latent constitutional disturbance* of severe nature.

We further consider that the severity of the local signs is caused by the lowered resistance of the tissues due to this latent infection which, judging from our and other cases, makes itself sufficiently evident in the course of the illness which follows the vaccination.

Treatment.—At first the area was merely protected from septic infection by pieces of sterilized lint lightly held in position by pieces of bandage. When the inflammatory symptoms appeared, antiseptic dressings in the form of 1 in 80 carbolic lotion were applied on lint, while the whole area was covered with cotton wool, loosely held in position by first a bandage and then a handkerchief.

We, however, quickly came to the conclusion that closed dressings were not indicated, and we then applied no dressings and no bandages, but simply left the leg exposed to the air in an elevated position, and applied at first dry powders, later lead and opium lotion, and finally *calamine lotion*.

There is no doubt in our minds as to the great success of the calamine lotion, the elevation of the leg and the perfectly open treatment, and if we had a similar case this is the course we should adopt from the beginning.

When the slough separated the resulting ulcer was dressed first with carbolic lotion 1 in 80, then with boracic ointment, and finally with red lotion, and this was quite satisfactory. The only medicinal treatment was to administer purgatives from time to time in order to keep the bowels freely open.

The attack of *gout* was treated in the usual way by diet, Vichy water, salicylates, colchicum, &c., and readily yielded to this therapy.

Remarks.—The lady in question had resided for many years in the Tropics, but had always enjoyed good health, and had never suffered from any of the usual tropical fevers or illnesses, except sandfly fever. She was vaccinated once in infancy, and again some fifteen years ago, but this time the vaccine failed to take. She had suffered at times from aches and pains which were considered to be gouty in nature, and for which she took "aspirin," which readily cured them, but she had never suffered from a proper attack of acute gout such as developed in the present illness.

It is quite possible that Vaccinia in a person in a very susceptible condition lighted up the gout, and it is equally likely that the resistance of the tissues lowered by the latent gouty condition brought about the severity of the local reaction. In other words, the gout and the vaccination completed a vicious circle of pathological events.

We were very thankful that we performed the vaccination in one area only and not in two, and still more so that we had not done it in four places, as, judging by Crocker's case, we might have had much more severe trouble than that with which we contended.

To summarize: We believe that our patient, imperfectly immunized by vaccination (as she had only been twice vaccinated, and the last time, some fifteen years ago, being ineffectual) was rendered highly susceptible to the vaccinia which, acting upon tissues, the resistance of which was lowered by *latent and hence untreated gout*, produced *localized gangrenous vaccinia*, and by disturbing the general system gave rise to an *acute attack of gout*.

We venture to suggest that if a gouty diathesis is suspected in a person who has been long without vaccination, it would be as well to limit the vaccination to one area.

Khartoum,
June 18, 1917.

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FURTHER NOTES ON KERATODERMIA PUNCTATA.

By Albert J. Chalmers, M.D., F.R.C.S., D.P.H.
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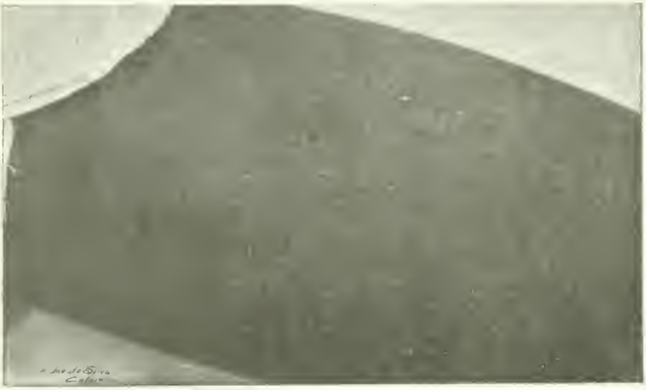
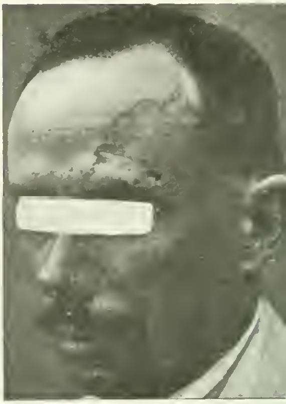
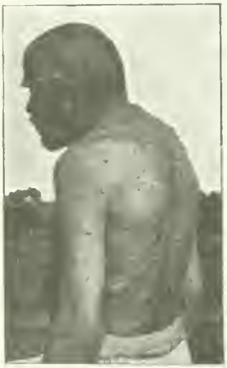
In our paper on "*Keratodermia Punctata*," published in this Journal on June 1, we left the ætiology of our case in a very nebulous condition, and though we have been unable to arrive at any definite conclusion at the moment, still we are able to correct two omissions.



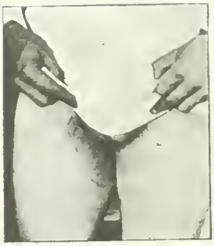
Dermatosis nigro-circinata (case observed in the Tropics).



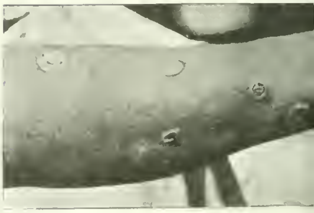
Dermatosis festonata frontalis.



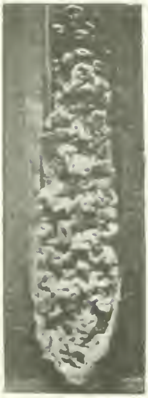
Fibroma molluscum.



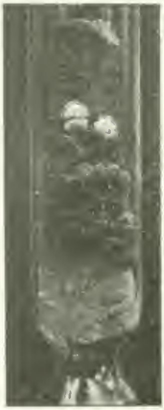
Dhobie itch.



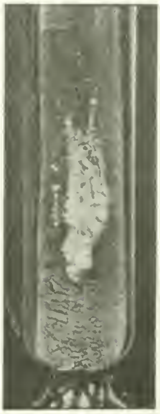
Accladiosis (case observed in the Tropics).



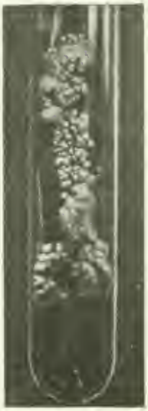
Hemispora rugosa Cast., culture on glucose agar.



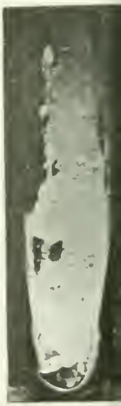
Accladium castellanii Pinoy, culture on potato (old).



Accladium castellanii Pinoy, culture on carrot.



Accladium castellanii Pinoy, culture on glucose agar.



Monilia bronchialis C
culture on glucose a

In examining the case originally, we carefully considered the question of the possibility of the disease being caused by yaws, because of Castellani's description of the formation of small flattened papules or nodules having a thick, hard, epidermic plug in the centre, and appearing on the palms and wrists. The plug falls off spontaneously, or is easily pulled out, when a deep depression remains.

This eruption, in several particulars, resembles our case, but, as already stated in our paper, the woman in question was in excellent health, and she had never suffered from syphilis, and, we ought to have added, that she was not suffering from and had never been known to suffer from yaws.

We were therefore able to exclude this disease as a cause of the condition we saw.

There may also be a clinical differentiation, because the cases due to yaws are not described as giving rise to hyperkeratosis of the palms, which certainly occurred in our case.

In the section upon diagnosis we ought to have differentiated *Keratoma Plantare Sulcatum*, described by Castellani some years ago in Ceylon, from *Keratoderma Punctata* by the former's restriction to the soles of the feet, together with the presence of the deep sulci, in addition to the punched-out holes in the thickened epidermis.

We regret these omissions, which were both accidental.

Khartoum,
July 15, 1917.

REFERENCE.

Castellani and Chalmers (1913). "Manual of Tropical Medicine," 2nd edition, pp. 1184 and 1599. London.

NOTES ON TROPICAL DISEASES MET WITH IN THE BALCANIC AND ADRIATIC ZONES.

By Lieutenant-Colonel Aldo Castellani, M.D., M.R.C.P., R.I.N.M.S.

Balcanic Zone.

(Continued from p. 214.)

Tropical Skin Diseases.

So-called tropical skin diseases are quite common in the Balkans during the summer months. I would first of all call attention to one which is extremely common among soldiers, and though not serious is the cause of very great discomfort, especially when marching, viz., *Dermatitis interdigitalis*. A few remarks on this affection may not be out of place, as in my experience it is very often wrongly diagnosed, and if not properly treated becomes chronic and gives extreme discomfort. *Dermatitis interdigitalis* or *Dermatitis rimosa epidermophytica* of the toes, is common all over the Tropics. It is known to the Ceylon planters as mango-toe. In my experience it is also common in the South of Europe and the Balcanic zone in the summer months. I have, however, also seen cases in England in people who had never been abroad. The patient first complains of very severe itching between the toes without there being visible lesions of any kind. To relieve the terrible itching the patient scratches very hard, portions of the epidermis become removed, and small superficial red, irritable abrasions are seen. Later on, in many cases, very painful fissures appear between the toes. The dermatitis in the Tropics subsides spontaneously on going to the hills. In Europe it subsides spontaneously in the autumn and winter months, to reappear in the late spring and summer, and this may go on for years. The symptoms are generally rendered much worse by wearing impermeable or badly ventilated boots.

The condition is due to a localization between the toes of *Epidermophyton cruris* Cast. 1905, on which a pyogenic infection is often engrafted. Apparently the fungus may remain there quiescent or semi-quiescent for a very long time, giving rise to practically no symptoms except pruritus, and occasionally a little desquamation. The clinical appearance does not, as a rule, suggest an epidermophytic or trichophytic affection or papuloid eruption in festooned or semi-circular arrangement being quite exceptional.

Treatment.—In the very first stage of the affection, when there are no cracks or abrasions, the use of an alcoholic salicylic lotion (2 per cent.), followed by a boric or mild salicylic or sulphur ointment (10 gr. to the ounce) is often efficacious; a foot-bath twice daily in warm water with boric acid or a little permanganate is also useful; the toes and feet are then well dried, and a mild sulphur or salicylic ointment (10 gr. to 1 oz.) applied. Tr. iodine may be used with care. In the later stage of the affection, when there are abrasions and painful cracks, a good plan of treatment is the following: Paint locally, on the cracks and all over the toes, a strong permanganate lotion (10 to 30 gr. to 1 oz.), and then dust the parts with a powder, such as ac. boric 10 gr.; zinci ox. 1 oz.

In those cases in which the inflammatory symptoms are very marked with eczematoid or pyogenic lesions a soothing treatment is at first indicated, such as lead and opium lotion or resorcin lotion, ½ per cent. continuously applied. When the inflammatory symptoms have subsided the pot. perm. lotion may be used, or an ointment such as the following:—

Sulphur pr.	gr. v – xv
Ac. salicyl.	gr. ii – xv
Zinci ox.	gr. x
Vasel. ad	℥i

To the deep cracks a silver nitrate solution (3 per cent.) may be applied with care. The patient should be directed to use white stockings and change them daily, and to sprinkle them with boric powder, as well as the boots, which should not be air-tight. Canvas shoes are found to be a great comfort by such patients.

Dhobie Itch (Tinea cruris).

In the summer months I have found dhobie itch (*Tinea cruris*) to be quite common in Macedonia; as a rule these cases had been diagnosed as eczema. Most of them were due to *Epidermophyton cruris* Cast. 1905, a few to *E. rubrum* Cast. 1907, and one to *E. nodoformans* Cast. 1911. To a medical man with tropical experience the diagnosis is easy; the festooned appearance of the eruption—which is very itchy—with very definite raised margins generally affecting the inguino-crural or axillary regions is typical. Very often, however, the condition is diagnosed as eczema or severe intertrigo, and the patient is treated accordingly, with the result that it becomes chronic and gives extreme inconvenience to the sufferer. In ordinary cases it is advisable to start at once an energetic antimycotic treatment, and the following formulæ will be found useful:—

(1)	Ac. salicyl.	
	Sulphuris pr.	gr. xxx
	Vasel. ad	℥i
(2)	Chrysarobin	gr. v – xxx
	Zinci oxid.	gr. xxx – ʒi
	Vasel. ad	ʒi

When using chrysarobin, the patient should be informed that it stains the linen and that the skin may get greatly inflamed. Not rarely I have seen an enormous œdema of the penis in young planters who have treated their dhobie itch with too strong a chrysarobin ointment, or using crude goa-powder partly dissolved in vinegar. In such cases calamin lotion is very soothing.

In cases of dhobie itch with signs of acute eczematous dermatitis, before starting the antimycotic treatment it is advisable to apply a soothing lotion for a couple of days, such as the plumbi and opium lotion or resorcin, ½ to 1 per cent. So-called soothing ointments are, in a hot climate, very massy, and generally make the eczematoid conditions worse. To the cracks and fissures which occasionally develop in chronic cases the application of arg. nitr. in sp. æther nitr. (10 to 15 gr. to 1 oz.) is often successful and stops the terrible itching.

Tinea capitis.

Microsporon infections are very rare. Practically all the cases are due to fungi of the genus *Trichophyton*. There is a type which, clinically, is differentiated with difficulty from ordinary cases of profuse seborrhœa sicca, and is due to a peculiar trichophyton.

Tinea corporis.

Apart from *Tinea cruris* (dhobie itch), one often comes across cases of body ringworm. In one of my cases each affected patch showed several concentric rings. I propose to deal with this subject in a future publication.

Tinea barbæ.

Tinea barbæ is not rare. I have seen a case due to *Trichophyton nodoformans* Cast,

Prickly Heat.

In the summer months I found prickly heat very common in soldiers in South Macedonia and Salonika. In my experience it is often diagnosed as eczema, lichen planus, and scabies, and treated accordingly. Prickly heat is not a serious illness, but the irritation and discomfort it gives rise to is severe. A few remarks on its treatment may be useful.

All underclothing must be changed at least once daily. The parts affected must be washed with a perchloride solution 1 in 1,000, or an alcoholic solution of salicyl. acid (2 per cent.), followed by astringent and antiseptic powders, is useful, such as ac. salicyl. 10 gr., talci ad 1 oz.; ac. borici, 30 gr., talci ad 1 oz. Greasy applications are not, as a rule, well borne. For many years I have used, with good results, a lotion which has become rather popular in the East, where it is generally known after my name, people often going to a chemist and asking for it by this name. The formula for this lotion is as follows:—

Aq. salicyl.	gr. ii – v
Menthol	gr. x
Spir. rect.	ʒii
Glycer.	ʒi – ii
Zinci ox.	ʒvi
Calamin	ʒi – iii
Aq. rosæ ad	℥vi

To be well shaken and dabbed on the affected parts. Dilute with same amount of water when applied to the face, also when using it for children. It should not be used when a true eczematous dermatitis has developed on prickly heat lesions, as is occasionally the case. In such contingency liq. plumbi 1 to 2 dr. should be substituted for the menthol in the lotion, and the alcohol greatly decreased or taken away altogether.

SEBORRHŒA SPINULOSA.

Of this condition I have seen a case in Macedonia. The nose and cheeks of the patient presented a peculiar oily appearance, with very numerous yellow plugs—some of them acuminate and hard—protruding from the sebaceous ducts. Ordinary black comedones were absent.

TROPICAL TYPES OF PYOSIS.

These are quite common in the summer months, while ordinary impetigo is extremely frequent. The types of tropical pyosis I have seen in the Balcans are pyosis mansoni, pyosis tropica, pyosis cupelliformis and pyosis discoides. The reader interested in the subject will find an account of the first two in the "Manual of Tropical Medicine" by Castellani and Chalmers (section on Skin Diseases), of the third in a paper published by me in *The Journal of the Ceylon Branch, B.M.A.*, June, 1914. The last type, pyosis discoides, begins with numerous vesicles and roundish bullæ all over the body, which very rapidly dry into perfectly circular, bright yellow lesions. A typical case was admitted to the Polyamessi Military Hospital, Skoplje, in August, 1915. The patient, a Serbian soldier, was covered with very numerous circular, discoid-like, bright yellow lesions. Removing the crusts, perfectly circular, shallow ulcers were seen with clean-cut margins. The general condition of the patient was fairly good, but the temperature rose to 100-101° F. for several nights. He made a very slow recovery. Streptococci and staphylococci were grown from the lesions.

Veld Sore.

I have seen in the Balkans a form of pyosis absolutely identical with the veld sore found in South and Tropical Africa. The condition seems to be of streptococcus origin; the staphylococci present play only a secondary rôle.

Tropical Ulcers.

The following tropical ulcers have been observed, though rarely, in the Balcanic and Adriatic zones: Oriental sore, ulcus tropicum, ulcus infantum, granuloma inguinale, ulcus interdigitale.

Trichomycosis Flava, Nigra et Rubra.

This affection, which generally attacks the hair of the axillary regions, I have found extremely common in the Balcanic and Adriatic zones, nearly as common as in the Tropics. It has probably been known in Europe since a long time under the name Lepothrix, but the descriptions given in Europe have been most confusing, and nothing definite was known on the etiology, any number of different cocci and bacilli having been described as the cause of the condition by various authors. In 1911 I investigated the subject in Ceylon, and described three types of the conditions: The yellow type, the red type, and the black type.

I found out that the yellow variety is due to a nocardia, *Nocardia tenuis* Cast. 1909; the black variety to the same nocardia, plus a black pigment-producing coccus (*M. nigrescens* Cast. 1911), the red variety to the same nocardia, plus a red pigment-producing coccus, which has been later on more completely studied by Chalmers and O'Farrell and called *M. castellanii.* The description of these various parasites may be found in the "Manual of Tropical Medicine" by Castellani and Chalmers (section on Skin Diseases). The affected hairs show nodular formations, yellow, red, or black. The same patient may have two varieties: the hairs of one axilla may show the yellow variety, for instance, while the hair of the other axilla may show the red variety, or the same individual hair may present nodules of different colour. Macfie has recently described a fourth variety of the condition (fusca). The nodosities are easily detached from the shaft of the hair by scraping with a triangular needle or any similar instrument.

The treatment I have found to be most efficacious is washing the hair with a formalin lotion in spirit (1 dr. to 6 oz.), followed by sulphur ointment.

Madura Foot.

I have seen in Skoplje in 1915 two cases of madura foot, one of the ochroid variety, the other of the black variety. Both cases were Macedonian peasants. In the first one the granules were pale yellowish, as one sees in Carter's white mycetoma, and consisted mostly of very thin mycelial filaments. No cultures were made. In the second case the granules were jet black. An aspergillus-like fungus was present, possibly *A. bouffardi* Brumpt 1906. Attempts at cultivation failed.

Intertrigo Saccharomycetica.

I have seen, in Skoplje, a good case of this affection, described by me some years ago in Ceylon. The patient, a Serbian officer, complained of irritation and pain in the inguino-crural regions. The affected parts were angry red, with slight exudation. A saccharomyces-like fungus was grown. Application of glyc. boracis cured the affection in a very few days.

Saccharomycosis Epidermica.

Two typical cases were seen by me in Macedonia in 1916. In both the arms were affected, there being several dirty brownish patches consisting of very numerous blastomyces-like elements, which, however, were not grown. A formalin solution in spirit (10 per cent.) and plenty of soap cleared the patches.

Aspergillosis of the Beard.

A Macedonian presented various nodules on the hair of his beard. On nearer examination they were found to consist of an aspergillus-like fungus. A similar condition has been described in the Tropics by Chalmers and myself.

Trichosporosis.

An old Serbian soldier presented numerous nodules on the hair of his moustache. Microscopical examination showed the nodosities to be of hyphomycetic origin, and a trichosporon probably identical to *T. beigeli* Rabenhorst 1867 was grown.

Blastomycosis.

A case with the typical warty lesions (on the upper lip) has been seen by me in Macedonia. On microscopical examination saccharomyces-like bodies were seen and grown. Its cultural characters make it to be most probably a monilia.

Blastomycosis Glutealis.

Of this peculiar affection I have observed a case in Skoplje in 1915. The skin presented a diffuse induration with numerous openings, from which a purulent matter exuded. A monilia-like fungus was found.

Sporotrichosis.

A typical case due to *S. beurmanni* was seen by me in an island of the Adriatic in an Albanian patient. It got well rapidly under pot. iod.

Accladiosis.

Of this condition described by me in Ceylon, and which is not rare in tropical countries, I have seen a case in Macedonia. The patient, a peasant, presented all over the body, except the feet, ulcerative lesions sharply defined, roundish or oval, with granulating fundus; some were covered by thick, bright yellow crusts; a few gumma-like nodules were also present. A fungus was grown identical with the strains I isolated in Ceylon, and which were botanically investigated by the well-known mycologist, Professor Pinoy, of the Pasteur Institute. For further details on the malady and the fungus, *Accladium castellanii Pinoy*, the reader is referred to the paper published in the *British Medical Journal*, October 7, 1916. As regards treatment, potassium iodide given in full doses acts fairly well.

LEPROSY.

Leprosy is said to be fairly common in the Balkans, but I have seen only one case—in a peasant living not far from Uskub.

YAWS.

Yaws has been reported from Greece and other parts of the Balkans, but so far I have not come across any case.

TRENCH FOOT.

Trench foot is not a tropical disease, but as it has been considered to be of hyphomycetic origin, and etiologically related to madura foot by some recent authors (Raymond and others), though clinically totally different, a few words on the subject will not be out of place. The condition was quite common in the late autumn and in winter near Sorovich and Monastir. The affected parts are generally œdematous, of a dark red colour, and often painful; later gangrene may set in. An interesting feature to which I should like to call attention is that very often there is intermittent fever—generally low—even in patients having no malarial infection, and long before any gangrenous process has developed. In the liquid of the bullæ and in the gangrenous parts I have very often observed spirochætes. Various hyphomycetes may also at times be found, but their etiological rôle in my opinion has not been demonstrated. The treatment which has given me the best results in the first stage of the disease is painting the affected parts with an ichthyol lotion (ichthyol 1 dr., aq. ad 1 oz.), and giving internally calcium lactate in 5-gr. doses t.d.

TROPICAL DYSTROPHIES.

Pigmentary Dystrophies.—I have found leucoderma to be fairly frequent in Macedonia and the Southern Adriatic zone. In an island of the Adriatic I was consulted by a French officer for several leucoderma patches on his face and hands, which he said had developed since his arrival in the country a few months previously. Chloasma also is fairly common in summer. In a gipsy I saw a typical form of *chloasma symmetricum*, a condition described by me in the Tropics. The man, who was living on the outskirts of Skoplje, presented on each cheek, on the malar region, a well-defined, very dark-brownish, roundish patch. I have seen a typical case of *chloasma bronzinum* in a Macedonian, and a case of *melanonychia falciformis* in a Serbian lady, who was taking the greatest care of her hands, and not using any chemical which might be the cause of the pigmentation. I have come across two cases of *xanthoderma areatum*, and I have seen in a Macedonian young woman a typical case of that peculiar yellow pigmentation of the skin which I described some years ago in Ceylon under the term of "the yellow disease."

Ainhum.

Among dystrophies with no pigmentary changes I may mention a typical case of *ainhum.* The man, a Macedonian, presented on the small toe of his left foot a deep constrictive furrow, while the distal portion of the toe was somewhat swollen. No ulcerative lesion was present.

Dermatosis Festonata Frontalis.

I have seen a typical case in a Macedonian peasant, identical in every feature to the case I have described in the Tropics. A few words on this peculiar affection of the skin may not be out of place here, as no description of it is found in any dermatological text-book. The affection—which is not frequent—is generally found in Europeans who have resided for many years in the Tropics and who have lived an open-air life, such as planters and overseers, and have exposed themselves to the sun for long periods of time. In a well-marked case (see photo) the edge is festooned, at times slightly raised, often of a vivid bright red or coppery red colour, while the skin which it encircles has a peculiar whitish, occasionally leucoderma-like appearance, and may be slightly atrophied; at times small patches of hyper-pigmentation may be present. There is very little or no pruritis, and the sensation of pain, &c., is normal. The course is extremely long, the lesions slowly expanding peripherally. As regards the etiology we know nothing at all, but probably continuous exposure to the sun and glare is a contributory cause.

This affection is very often diagnosed, owing to the festooned edge, as a trichophytic condition, but the microscopical examination of scrapings from the edge, &c., never reveals any fungus; in the Tropics it is occasionally taken also for leprosy; it can be easily distinguished from it by the sensation being normal. It is not a syphilide, as salvarsan, mercury, and potass. iodide have no beneficial action whatever on the condition.

Prognosis.—The condition has no tendency to spontaneous cure in the Tropics, but it gets much better if the patient goes to reside in a cold country.

The treatment is very unsatisfactory. The patient must be advised not to expose himself to the sun and glare, though it is doubtful whether the condition is directly due to such exposure. A wide-brimmed topee or sun helmet lined with red cloth may be used.

The only drug which at times seems to keep in check the condition and occasionally induce a slight improvement is ichthyol, given internally and used as an ointment. The drug is given in the form of a 5-gr. tablet three times daily before meals. An ichthyol ointment or lotion (5 per cent.) may be applied to the affected skin at night; during the day a calamine lotion may be used. Mercury, potassium iodide, arsenic, and many other drugs I have tried have no effect whatever on the condition.

Dermatosis Nigro-circinata.

Of this condition I have seen a case in a very dark-skinned gipsy in Macedonia in 1915, identical to the two cases I have previously observed in Ceylon. In the Macedonian case the lesions were limited to the lower limbs; in the Ceylon cases, in one the thighs only were affected; in the other the thighs, abdomen, chest, and face were also affected.

The condition is characterized by the presence of black, elevated, fairly hard, ring-like or elliptical lesions, encircling apparently normal skin. There is no pruritus; sensation normal. The course is extremely long, lasting for years; in none of my cases did an improvement take place. The condition is easily distinguished from *tinea nigro-circinata* by the absence of fungi and by the failure of antimycotic treatment. In my cases it did not appear to be a frambœside or a syphilide, Wassermann being negative, and salvarsan, mercury, and potassium iodide having no effect whatever on the condition. The histological examination of the pieces I have not yet carried out, but possibly the condition is related to porokeratosis, from which, however, it differs clinically by the multiplicity of the lesions.

Tropical Types of Keratosis.

A negro African soldier of a Colonial regiment in Macedonia showed the peculiar pitted keratosis of the hands I described in 1905. Small, hard, flattened nodules are present with a thick, hard epidermic plug in their centre. These plugs fall off, the nodules disappear, and the palms acquire a peculiar pitted appearance.

From the history he gave he must have been suffering from yaws some years previously. This type of keratosis is, in fact, generally a late manifestation of yaws. Another African soldier in the same regiment had another type of keratosis, with great thickening of the epidermis of the soles and palms and a few sores, a condition certainly of syphilitic origin. It is common in Ceylon and other parts of the Tropics in syphilitic natives who go about barefooted.

Keratoma Plantare Sulcatum.

I have observed in Macedonia a typical case of *keratoma plantare sulcatum*, a condition described by me long ago, and a general account of which may be found in the "Manual of Tropical Medicine" by Castellani and Chalmers (section on Skin Diseases). In the Macedonian case the epidermis of the soles was greatly thickened, and numerous deep punched-out holes and deep furrows, straight, semicircular, or ellipsoid were present. No ulcerative lesions. There was no sign of local inflammation, although the patient complained of tenderness of the feet after much walking. No history of syphilis, and mercury and potassium iodide had no effect whatever on the condition, which improved only on using a strong salicylic ointment.

◆

Filaria live longer in Blood containing Carbon Dioxide (M. Yamada, *Mitteilungen a.d. Med.*, March).—It is suggested that this may explain why the filarial larvæ are present in the blood at night.

Danger of Malaria and Yellow Fever in France (R. Blanchard, *Bulletin de l'Académie de Médecine*, May 22).—The intermediate mosquito hosts of these diseases are found in southern France, and a committee has been organized to determine which sections are free from them, so that the convalescents can be directed there. English troops in Macedonia did not suffer from malaria by any means to the extent of the French troops. British officers considered the Macedonia campaign a "medical war," and gave the medical officers full charge of it, with highly favourable results for the health of the troops. "Would that it had been the same in the French Army!"

Prophylaxis of Camp Epidemics (A. Capogrossi, *Policlinico*, May 20).—Vaccines should be made from the special germs prevailing at the spot at the time. Special dangers occur when an enemy trench has been taken. The dead must be buried at once and everything else burned. This is particularly imperative where cholera and typhus are liable to be found, and no soldiers should be allowed to put on any garments, &c., from the enemy stores or from prisoners. The sick and wounded should be isolated, as there may be carriers among them. Cholera vibrios may enter through the tonsil, and induce cholera on reaching the intestines only when other germs already installed there have reduced the resisting powers. When latent malaria flares up under the influence of a wound, the fever curve is liable to be a continuous high remittent fever, with nothing characteristic of malaria, but suggesting local complications, especially after skull wounds.

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THE JOURNAL OF

Tropical Medicine and Hygiene

OCTOBER 1, 1917.

SELECTING MEN PRONOUNCED UNFIT FOR MILITARY SERVICE OR DISCHARGED AFTER SERVICE FOR WORK IN THE TROPICS.

FOR a good many years the writer has been kept in constant touch with men (and some women) about to proceed to take up work in the Tropics. The opportunity for gaining experience in this direction has been greatly diversified since the War began by "medical unfits" for the Army applying for posts abroad, by wounded men maimed in trunk or limbs and by men discharged, after trial in the Army, as bodily unfit and unsound. The War-rejected group adds greatly to the anxiety and responsibility of the medical examiner, for he has to deal with soldiers discharged by medical men in the Army for one reason or another as unfit.

With those surgically maimed the difficulty is, as a rule, but slight. In the case of the loss of a limb, for instance, successfully replaced by an artificial mechanism, the question resolves itself into such aspects as: Is the stump sound? Is the mechanism strong, well-fitting, and likely to prove efficient? Will the loss of a leg prevent him walking over, say, a rubber plantation should rubber planting be his vocation? This is a problem which it is not difficult to solve, for if he can walk well now, get up and down stairs without distress or much hesitation, it is possible he will be fit for rubber planting if the plantation is an old one, but not when new ground is being broken up and walking a trial. The rule is one-legged men for office work, and one-armed men for rubber and tea plantations; but there will be many exceptions to a general rule of the kind; for a man with but one foot, with the excellent artificial limbs now being made, is able to walk on almost any ground, however rough; and a man with but one hand can do even delicate work with an artificial hand which is surprising in its variety and intricacy. Learning to write with the left hand is, of course, easily acquired should the right hand be incapacitated or destroyed.

With injuries to the cranium there must be difficulties in deciding as to fitness or the opposite for tropical life. If a large piece of bone, say 2 in. square, is lost, one has no hesitation in declining to pass a man in this plight for the Tropics, especially at a stage in which the wound must have been comparatively recent—that is, within, say, a year or two, and he is only just getting accustomed to home work.

If, however, a small piece of bone only has gone, say the size of a trephine hole, with no evidence of brain injury left, the question is different. If the aperture is below the hat brim, say low down in frontal, temporal, or occipital aspects, there need be no hesitation in passing the candidate, for out of doors the aperture will be immediately under the shade of the brim of the hat. Should, on the other hand, the injury be in the vault, the danger from exposure to the direct rays of the sun is greater; but with ordinary care in always wearing a sun hat out of doors, especially when lined with orange-red coloured material, there need be no great anxiety about passing any man under these circumstances, unless it be one who persists, even in the Tropics, in the foolish custom of going about hatless in all weathers.

Many commercial firms are, however, wary of choosing hatless men, as the brain that dictates such a reversion to the original type is not usually likely to be of benefit to their business.

A wound of the skull involving loss of bone along the line of where the hat brim presses should not be sent to the Tropics.

When the bullet has traversed the brain completely and made apertures of entrance and exit in the skull, the candidate should not be passed for the Tropics until at least four years have elapsed since the injury; for, although apparently sound in body and mind, latent effects may develop which, no doubt, excessive heat and sunlight favour. It need scarcely be said that candidates with any injury to the brain with a syphilitic history should systematically be rejected, however perfectly they may have been so-called "cured."

Bullet or shell wounds of the chest involving the lungs should be carefully considered. Some of these are wholly negligible as danger foci; but when any patch of the lung is "thrown out of action" as regards breathing and it is under two years since the injury, the candidate should not be passed.

Again, if friction or râles is heard over the tract of the bullet rejection should follow for the Tropics; that a tropical climate may improve matters is delusive and wrong in practice and principle. The "asthma" which so frequently follows gunshot injuries to the lung being of a surgical origin is not calculated to be benefited by change to the Tropics, as might be the case when the "asthma" was due to non-surgical causes. Midway between surgical and the other unrecognized forms of "asthma," such as those induced by being "buried," in which shortness of breath and interference with lung and consequently chest expansion occur, we have a condition which may last some considerable time. It is difficult to say how long, as experience is but limited as yet, but the writer can vouch for a duration of at least two years in a man who had been "buried." It is reported that these lung cases, after being "buried," do badly in the Tropics, as indeed might be expected; whatever the nature of the "asthma" or wheezing thus induced may be, it is evident that it causes a limitation of respiratory power which, in warm climates, from the fact that the expansion in the air due to continued heat has less oxygenating power than in cooler regions where the air is denser, will necessarily bring about distress in breathing.

Mental conditions brought about by shell shock are another cause of anxiety on the part of the medical officer examining candidates for work in tropical countries. It may be stated at once that experience, short as it is, is against sending men who have "recovered" from shell shock to the Tropics. How far shell shock is due to real cerebral abnormality or to a nervous temperament, or to the two combined, it is impossible to say. We know that persons of a nervous temperament do badly in the Tropics at all times, and this, aggravated by shell shock or the state of mind induced by escape from death—it may be once or more times, be it in the field or at sea—is calculated to still further emphasize the nervous strain in the man's economy and character, and render life in the tropical bungalow intolerable. These are but a few of the perplexities which beset medical examiners at present when dealing with the selection of fit persons for tropical life, but they are sufficient to show the call for great care on the part of the doctor at home, for the experience at the other end—that is, from medical men who receive these men under their care in the Tropics itself—is limited in the extreme. The writer is accustomed to remonstrances on the part of men abroad that such and such a man should have been sent out, who unhesitatingly blame the doctors at home for either carelessness or ignorance of what tropical life is. But the doctor at home is asked privately by the firms who send men for examination to him "not to be too particular in the examination," as it is imperative that someone must be sent if their business is to be carried on at all; and that it is impossible to get any candidates except those who are physically unfit for Army service or men discharged from the Army and Navy owing to physical or mental incapacity, or such ailments as pleurisy, pneumonia, asthma, cardiac weakness, tuberculosis, or rheumatism developed while serving, but now supposed to be "cured" of their infirmities.

J. C.

Annotations.

Trench Foot.—V. Raymond (*Paris Médical*, March 24) considers that so-called frost-bite is caused by a fungus. Treatment was adopted with good results by:—

Powdered camphor	...	1·1 gm.	...	½ gr.
Sodium biborate	...	15 gm.	...	7½ gr.
Boiled water ...	...	1,000 gm.	...	1 oz.

Tropical Sloughing Phagedæna.—Spick (*Le Caducée*, August 15) treated in Morocco many cases in natives brought from tropical Africa which on account of the horrible smell required isolation. Bacteriologically, the sores contained the fusiform bacilli and spirochætes of Vincent.

The sores were swabbed with peroxide of hydrogen to remove slough, scissors being used when required. They were then dried and freely powdered with iodoform. Cherry red cautery was passed over the iodoform in contact with the sores, penetrating where required into pockets, so that the nascent iodoform both cauterized and sterilized the sores; dry dressing was applied. The sores were swabbed daily; iodoform with cauterization was done every fourth day. In twelve days sores of not more than 2 in. or 3 in. in diameter are no longer sloughy, but have healthy granulation, which only require treatment by silver stick and occasional dressing with Reclus's ointment without mercury. More extensive sores, especially of the toes, which require amputation, trimming up tags, and more iodoform and cautery with drainage. These cases require in addition intravenous arseno benzol, beginning with 15 cg., then 30, 45 at weekly intervals. In seven cases the dose was increased to 60 cg.

Mistakes in Diagnosis of Liver Abscess (E. Odriozola, *Cronica Medica*, June).—A man, aged 27, presented symptoms indicating a cancer of the liver while necropsy revealed merely a large abscess in the posterior portion of the liver. Among the lessons taught are that suppuration in the liver must be excluded in every case of enlargement of the organ, with fever, before any other trouble is even thought of. Abscesses in the convex aspect of the liver are most frequently mistaken for other affections. There may not be the slightest trace of jaundice, and gastro-intestinal disturbance is by no means common. Pain in the shoulder occurs early and is acute and persistent, much more than with any other affection. Puncture from the front and side are negative, and when this is the case, puncture from the rear is called for, cautiously avoiding the course of the inferior vena cava. The blood picture is not characteristic, but complications in pleura and lung are most instructive. On suspicion of an abscess, operative treatment is indispensable. Rapid anæmia may accompany a simple abscess, as in this case. The condition was so grave when first seen that operative treatment was almost out of the question even if the diagnosis had been correct.

Uræmia in Cholera (W. Valk and C. D. de Langen, *Nederlandsch Tijdschrift voor Geneeskunde*, April 14).—The retention of nitrogen in the thirty-four cases tabulated amounted to from 3·31 to 5·9 grm. urea per litre of the blood serum in 50 per cent. of the patients. In ten others it ranged from 1·75 to 2·72, and in only seven was below this. In another group of four cases Ambard's constant was calculated from the urine and blood. The retention of nitrogen in 50 per cent. was thus higher than the figures obtained even with contracted kidney. As there is no intake of nitrogenous food by cholera patients, and the decline in weight from the loss of fluids and the thickening of the blood does not suffice to explain this extreme uræmia, there must be formation of urea from the albumin of the body. All the patients died that had this high nitrogen blood content. In two dubious cases, with no vibrios to be found, high urea content of the blood confirmed the diagnosis. In one the uræmia declined, and recovery was anticipated and occurred. In the other, two days later the retention had reached a higher figure, and death soon followed.

Clinical Note.

INTESTINAL OBSTRUCTION DUE TO *ASCARIS LUMBRICOIDES*.

By WALTER E. MASTERS, M.D., L.R.C.P.

Medical Officer, Central Africa, late Medical Officer, Colombia.

In the issue of March 15, 1917, there was an article upon the above subject, in the "conclusions" of which are the following remarks: "The disease is rare. . . . Most cases are diagnosed at necropsy or on the operating table, and only seldom is the mass of worms expelled through the natural channels. Although the most drastic purgatives may be of no avail, the enema may in a few cases cause the surgeon to lay aside his knife."

I am reminded by this article of one of my cases in the Choco, Republic of Colombia, during 1914. A well-developed negro, aged 30, was placed upon my verandah at sunset one evening in a condition of collapse. The abdominal pains had been and were so acute that the legs were tightly flexed upon the abdomen, and the patient was so exhausted that he could cry out no more. His look was agonizing, and his entreaties that something should be done for him were pitiful. His pulse was 120, and his temperature normal. There was no particular history of constipation for any prolonged period. Intestinal obstruction was diagnosed, but the cause was obscure. Laparotomy was decided upon for daybreak the next morning should he have survived, but in a bush hospital and without much skilled assistance I did not relish the idea of possible intestinal surgery with an excess of fæcal matter present if I could avoid it; hence, calomel gr. 5 was given, *statim*, followed by 1 oz. mag. sulph. An enema was also given, and the patient watched. During the night, after much retching, the patient vomited up a "knot" of round worms, four in number, which disentangled themselves upon the floor after they had been rejected. The longest one measured 18½ in., the longest I have ever recovered from any patient. The other in-patients asked the one in question what he had been eating that he should vomit up such things, they believing that he had a perverted appetite and well deserved the disease he had. During the night he also filled two-thirds of a large-sized bucket with fæcal material, in which were large numbers of *Ascaris lumbricoides*, unfortunately not counted.

Relief was immediate, the pains ceased at once, and in three days the patient was at work again. He was particularly grateful, believing that I had saved his life. I have no doubt that the purge disturbed the "knot" of worms, the movement resulting in retching and vomiting, followed by the rejection *per os* of the worms. Undoubtedly they were the cause of the obstruction, but exactly where they had been is difficult to say. They must have come from the small intestine somewhere, back through the pyloric orifice, stomach, cardiac orifice and œsophagus to have been rejected *per os*. I hesitated much about giving a purge for intestinal obstruction, but in this case the end justified the means.

It occurred to me that the rarity of vomiting up an intestinal obstruction of round worms might be sufficient justification for its publication.

Abstract.

OBSERVATIONS ON THE PATHOLOGY OF BARCOO ROT (VELD SORE?): WITH SUGGESTIONS AS TO TREATMENT.[1]

By C. J. Martin, F.R.S.

By the middle of the summer of 1916 a number of men of the Anzac Division, which had been operating in the desert east of the Suez Canal for upwards of six months, suffered from spreading superficial ulcers on the back of the hands, extensor surface of the forearms, and, to a less extent, on the back of the feet and on the shins. The ulceration resembles that met with amongst bushmen in the back-blocks of Australia, and is known locally as barcoo rot. It was recognized by the men as the same disease they had seen or experienced in Australia.

Superficial ulcers were also troublesome during the Boer war. They affected troops kept on trek on the high veld, and the disease was labelled "veld sore."

Dolbey (*Brit. Med. Journ.*, vol. i, p. 76, 1903) concludes from his experience that troops were not liable to veld sore until they had been at least three months in the country. Life during the dry weather in the Australian back-blocks, and campaigning on the high veld or the Sinai desert present conditions which are not unlike. In all three cases water for washing is minimal; prolonged subsistence upon bread, biscuit, and salt or tinned meat, with lack of fresh vegetables, is the rule. Further, appropriate dressing of the sores in the early stages is difficult or impossible whilst the patient continues his occupation. Like veld sore, barcoo rot is difficult to cure in the above conditions, but readily yields to treatment when the patient comes into one of the towns. To what extent this is to be attributed to facilities for greater cleanliness, appropriate surgical dressing, or to dietetic improvements is uncertain.

Brief Description of Barcoo Rot.

The patient may remember abrading the skin, but whether or not, the first sign is usually a bleb or blister containing thin watery pus and surrounded by an area of slightly inflamed skin. The blister may be the size of a sixpence, or even larger, but before it reaches this size it is generally broken. The denuded surface shows little tendency to heal, but slowly extends at its margins, at the same time deepening until there are no more epithelial structures left. The ulcer, however, remains shallow, and it is unusual for the fibrous layer of the skin to be destroyed unless it becomes infected with virulent staphylococci. The glands are not inflamed unless secondary infection occurs, and there are no constitutional symptoms.

When healing has occurred areas of glossy skin, more or less denuded of hairs and sweat glands, are left. Cicatrization does not occur unless the true skin is destroyed. Infection of fresh areas of skin in the neighbourhood is usual, so that the patient has several ulcers of different ages. The disease in its minor forms is extremely annoying and, when the ulcers have become large, incapacitating.

The symptoms and pathological findings have no resemblance to the slowly evolving leishmaniasis known under the names of *Bouton du Nil*, *Clou de Biskra*, *Bouton du Caire*, &c.

Observations on the Pathology of Barcoo Rot.

On a visit to an outlying field ambulance I was shown twenty men admitted for obstinate ulcers of considerable extent. The ulcers were shallow, mostly on the back of the hands and wrists—that is, in areas exposed to small injuries, and rich in hairs. The smooth surfaces were free from ulcers, and the progress of an ulcer appeared to be inhibited as soon as it extended to a hairless portion of skin.

It seemed advisable to examine the state of the hair follicles, both within and around the ulcers, and I plucked a number both from the base of the ulcer and from the reddened slightly swollen skin at the margin; many of the hairs were loose. I wrapped the hairs in paper moistened with 70 per cent. glycerine for transport. At the laboratory the hairs were stained by Gram's method and counterstained very slight with weak fuchsin, dehydrated, and examined in clove oil or balsam. In all of the hairs withdrawn from the base of the ulcers, and in many from the inflamed margin, Gram-positive microbes were present in the hair sheath. They were mostly cocci, but in the hairs from three of the cases bacilli, which at the time I took to be diphtheroids, were also present. The infection extended usually to the lower end of the hair follicle.

Infection of the hair follicles was confirmed by microscopical examination of fresh material, and cultures from the bases of removed hairs and from the contents of early blebs were made upon blood agar and ordinary agar. *Staphylococcus albus* was the predominating organism, but some *S. citreus* and a few *S. aureus* were also present. In one case a diphtheroid was abundant. This proved to be

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[1] Abstracted from the *British Medical Journal*, June 9, 1917.

Bacillus diphtheriæ.[1] Diphtheroids are not uncommon in lesions of the skin, such as ulcers, vaccinia pustules, impetigo, and eczema,[2] and I regarded it as a chance concomitant of the staphylococcal infection, and did not investigate it further at the time. The case differed in no obvious way from the others, and there were no constitutional symptoms at the time.

The microbial infection of the hair follicles appeared to be confined to the connective tissue sheaths, except in very badly affected hairs, in which the base was disorganized and the layers of the root sheaths unrecognizable.

The pus from the early blisters before they were broken afforded only growths of staphylococci. Generally there was a hair, often a very small one, passing through them, and the follicle of the hair was invariably infected with staphylococci.

The cocci cultivated were, as mentioned above, mostly varieties of *Staphylococci albus*, with a few *S. aureus* and *S. citreus*. Their virulence is presumably low, for in uncomplicated cases there is no tendency to invade the true skin, and no involvement of the lymph glands occurs.

A few experiments were made upon the biochemical characters and pathogenicity of some of the cocci isolated. Six white staphylococci colonies, derived from four patients, were examined as to their action on milk and gelatine and their fermentation of lactose and mannite. They all clotted milk and liquefied gelatine with varying rapidity, and fermented lactose. None fermented mannite. They were not hæmolytic for human blood as tested by Eijkmann's agar plate method. They appear, therefore, to correspond to Welch's *S. epidermidis albus*, as defined by Gordon (1906).

The cultures of *S. aureus* and two of *S. citreus* from hair follicles which were tested in the same way fermented mannite. Two rabbits injected intravenously with 2 c.c. of a broth culture of the white cocci and one with the same quantity of the broth culture from the *aureus* colonies were not made manifestly ill.

My observations on the bacteriology of barcoo rot are in general accord with those of Ogston (1901) and Harman (1904) upon veld sore. Ogston and Harman, however, make no mention of any infection of the hair follicles. Ogston saw only Gram-positive cocci in fluid from the edge of ulcers. Harman cultivated only staphylococci from the unbroken vesicles. These gave the cultural characters of *S. pyogenes aureus*, but grew rather more abundantly on culture media than a virulent strain with which they were compared. They were not virulent for rabbits. Harman was much impressed by the resistance to heat, to the effects of drying, and to the action of corrosive sublimate possessed by his cultures, but this was not, I think, greater than has been met with in some strains of staphylococci.

The infection does not spread from one to another among the troops, and barcoo rot affects men living in solitude. Neither disease seems to be associated with particular occupations. It would seem probable that barcoo rot, and possibly veld sore, too, is due to the infection of the epidermal structures with staphylococci of low virulence, such as abound upon the skin. In barcoo rot the infection of hair follicles is apparently the common way in which it begins, and the usual manner in which it spreads at the margin of the ulcer.

Improper dressing and neglect of the sores also play an important part, for I have seen them heal up rapidly under appropriate dressings when no improvement in diet was possible. The fact that the African natives did not suffer whereas the Boers did suggests, however, that lack of washing and of simple surgical dressing is alone an inadequate explanation.

Treatment of Barcoo Rot.

In hospital the ulcers generally heal up slowly under any sort of wet antiseptic dressing, but are very difficult to deal with in the field. A wet dressing is unhandy when a man has to go about his business, and it is difficult or impossible to change it sufficiently frequently. Moreover, in a hot climate it soon becomes converted into a dry dressing and adheres to the ulcer.

If the ulcers are thoroughly cleaned up, powdered with calomel and covered with cotton-wool, the last being affixed by strapping, good results followed. This method is satisfactory for small ulcers, but the cleaning up must be very efficiently performed.

In view of the observations on the pathology of barcoo rot described above, it seemed not unlikely that the infection of the hair follicles was largely responsible for the continuation of the ulcerative process in the centre, and its progress at the margins of the ulcer. An infected hair follicle is like a foreign body, and healing will not occur until it is either sterilized or ulcerated out. Acting upon this idea I removed the hair or hairs traversing the early blebs, and found that these healed straight away. The patients soon realized the efficacy of early removal of the hair follicles in suppressing these secondary infections, and undertook this part of the treatment themselves. Next, working on the principle employed to restrict a bush fire by burning an area in front of it, I attacked the larger ulcers, removing the hairs from their base and around their margins, and was pleased to find that the ulcerative process was stayed, and healing commenced at once.

The extensive ulcers, in the floors of which no epithelial structures remain, naturally take a long time to heal, but this period is abbreviated by the transplantation of numerous snippets of skin from the abdomen.

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[1] Fatal for guinea-pigs in doses of 0·5 c.c. eighteen hours' broth culture in thirty hours; 0·1 c.cm. antitoxin protected against 2.5 c.c.

[2] The records of the finding of diphtheroid bacilli in skin lesions are collected by Graham Smith in Chapter IX of his book in collaboration with Nuttall, "The Bacteriology of Diphtheria," Cambridge University Press, 1908.

Original Communications.

NOTES ON A CASE OF ESPUNDIA (NASO-ORAL LEISHMANIASIS) AND THREE CASES OF KALA-AZAR IN THE SUDAN TREATED BY THE INTRAVENOUS INJECTION OF ANTIMONIUM TARTARATUM.

By J. B. Christopherson, M.A., M.D.Camb., F.R.C.P.Lond., F.R.C.S.Eng.

Director of the Civil Hospitals, Khartoum and Omdurman.

During the six months ending June, 1917, we (Drs. Izzedin, Maschoieff, and I) have been testing at the Khartoum Civil Hospital the above-named treatment for leishmaniasis as it occurs in the Sudan. The results we have obtained confirm the very favourable reports from South America, Sicily, India, and elsewhere.

The three clinical varieties of leishmaniasis which are found in the Sudan are:—

(1) Cutaneous—oriental sore.
(2) Muco-cutaneous—naso-oral (or espundia).
(3) General—kala-azar (infantile and adult).

(1) No case of oriental sore has presented itself at the hospital during the above-named period, therefore the treatment for it has not been tried by us, but observers in other countries [1], [13], [28], [19] have conclusively done so, and the opinion of Torres [27] and Ratello [19] is that cutaneous leishmaniasis responds more readily by treatment by intravenous injections of tartar emetic than the mucous membrane infection. In the case of espundia which I describe there did not appear to be much difference in the rate of improvement between mucous membrane infection and skin, and possibly the difference noted by the above workers may be due to leishmaniasis in one case cutaneous, and in another (different patient) mucous membrane, being compared, and not mucous membrane and cutaneous in the same case.

Difference of strain of the virus and constitutional differences of the various patients would, perhaps, cause the differences noted by these authors.

(2) Espundia (naso-oral leishmaniasis) is a much more formidable condition than oriental sore, accompanied by great destruction of parts and, consequently, deformity of nose and mouth (fig. 1) [5].

It is so situated that the effect of any treatment can be readily seen and daily progress watched.

With regard to the case tried, I can only say that after a week's treatment (six injections) a very noticeable improvement took place, and the affected area was changed, mucous membrane and cutaneous, from a loathsome, indolent, flabby, unhealthy looking sore into an ulcer with a healthy, granulating surface and healing edges.

If figs. 1 and 3 are compared with figs. 2 and 4, some idea of the rapidity of action and the completeness of the cure of leishmaniasis by tartar emetic injections, both most striking, will be realized. (The fig. 4 was taken three weeks after treatment began.)[1]

(3) Kala-azar (general leishmaniasis) in the adult is the most fatal of all forms of leishmaniasis.[2]

We tried the intravenous injection of tartar emetic in three cases. One was an unqualified success. The other two were unsuitable cases for the treatment, and consequently died.

I will take the case of espundia first.

The photos (figs. 1 and 3) give some idea of the gravity of the disease, its extent, and the destruction involved.

The case was sent down by Dr. S. R. Susu from Mukwar (Sennar) on the Blue Nile, a neighbourhood where leishmaniasis is endemic (the result of being situated on the road from Abyssinia (where the disease is prevalent) to Khartoum).

Gatu Quieter (male), Kenzari tribe, aged 60, partly Arab, partly Negroid.

The disease commenced four or more years ago inside the nose (probably in the septum—it usually commences there—and I cannot help thinking that the virus is inoculated during the act of "picking the nose," a habit inveterate amongst Sudanese).[3]

The septum and alæ nasi are ulcerated away, and the nose has fallen in owing to want of septal support, and the skin of the nose hangs like a flap (well seen in fig. 1) over the anterior nares, completely closing the nasal cavity.

The whole of the upper lip is occupied by a large, red, raw, unhealthy granulating surface, also hanging (like another flap) over the mouth; the granulations, flabby and unhealthy looking, are much raised above the level of the surrounding skin (superabundant granulations, the skin edges showing no signs of healing). No red upper lip apparently remains.

If the nose flap be lifted up (fig. 3), the ulcerated area of the lip is found continuous with that inside the nose. The whole nasal cavity appeared to be ulcerated—sides, septum, floor—and covered with massive yellow crusts under which discharge accumulates.

It is a very destructive ulceration too, for septum, inferior turbinated bones, and alæ nasi are gone in parts. Inside the mouth the appearance is characteristic. The lower jaw is normal and unaffected: the teeth of the upper are loose, especially in front, each tooth surrounded by a vallum of ulceration (fig. 5), from which oozes discharge—in fact, there is pyorrhœa alveolaris, but it is due to an invasion of the Leishman-Donovan body, and the L.D. body can be demonstrated from here, as it can from the upper lip, the nose, or the ulceration on the hard palate.

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[1] The only other case of espundia (a mild one) which I have come across, it is true got well with care and the orthodox surgical treatment, but it took months to do so [8]. The present case was going from bad to worse when the tartar emetic treatment was instituted.

[2] Infantile leishmaniasis is found in the Sudan up the Blue Nile (Marshall), but I have not come across a case at Khartoum. All cases of kala-azar in Khartoum itself up to the present have been imported into the town from out-stations

[3] Personally, I think that oriental sore is due to direct inoculation of the virus. In the Sudan it is generally seen on parts—contact places—such as the skin over knuckles, especially the 4th metacarpo-phalangeal and other bony protuberances (head ulnar), also in the neck, where the virus might easily be rubbed in or the sore contracted through contact.

On the right side of the hard palate the mucous membrane is swollen and soft and velvety in appearance, over an area the size of a shilling, as if the hard palate (superior maxilla) underneath were affected. The infection commencing in the septum of the nose spreads to the nasal floor, and thence to the mouth by means of the anterior dental canal—at least, this seems probable.

No lymphatic glands are affected. The condition, I think, is therefore a local one.

Treatment was commenced on May 11, 1917, by the intravenous injection of $\frac{1}{2}$ gr. antimony tartrate in 20 mm. distilled water. This was repeated on the following day, and on the third day 1 gr. was injected (in 20 mm. water). This was found too strong, so 1 gr. in 40 mm. distilled water on the fourth and fifth day, then one day's interval, and 2 gr. antimony tartrate ($\frac{1}{2}$ gr. to 20 mm.) was given and repeated every other day.

On the sixth day the ulcerated surface was obviously improving. After eight injections of 2 gr., $2\frac{1}{2}$ gr. every other day were given twice, and then 3 gr. every other day from June 4, 1917, to June 26, 1917, when the disease—mouth, nose and lips—seemed to be quite healed. Treatment was continued till July 16, when he was discharged from hospital.

The man was naturally a dull, insensitive sort of fellow, and one would not expect him to be an accurate register of the physiological effects of the drug, but it did not appear to have any ill-effects at all on him beyond certain small rises in temperature, which I suspect were due to local phlebitis at site of injection, as certain small localized abscesses (necrotic areas) occurred.

Locally the mouth, nose and lip were daily cleared of crusts and kept clean and syringed with a 1 per cent. solution of antimony tartrate. Improvement was noticeably taking place after six days. In three weeks the condition was healed except for a small area on the upper part of the lip, and in eight weeks the whole disease appeared to be cured—that is, ulceration had completely healed, and there were no Leishman-Donovan bodies to be found under the healed surface.

Before coming to Khartoum Hospital the man had had the disease at least four years. For some months previous he had been treated by usual orthodox surgical methods, and had had arsenobenzol injected with no good results; in fact, he had become tired of unsuccessful treatment, and had returned to his village as incurable. There is no doubt that tartar emetic by intravenous injection had the most beneficial effect on this case of naso-oral-leishmaniasis, justifying the use of the term specific.

The three cases of kala-azar were consecutive and not picked cases.

(1) Ahmed Khalil, male, 20, Berberine. Died.

(2) Mohammed Yehya, male, 32, Yeman. Recovered.

(3) El Naish Ayish, female, 35, Sudanese. Died.

One recovered, two died. The recovery was so striking, and followed so obviously on the administration of the drug, that there can be little doubt about the specificity of the treatment.

The other two cases were (looking backward) so unsuitable for the treatment that I hope by publishing them I shall draw the attention of practitioners not yet conversant with the remedy to the class of case which is unsuitable, and where it is useless—and may be worse than useless—to attempt the treatment.[1]

(1) Ahmed Khalil, aged 20, male, the servant of an official on duty in the Kassala Province.

In June, 1916, the servant of another official died of kala-azar, and Ahmed Khalil was lent to the latter, and he probably used some of the dead man's equipment, and so may have contracted the infection; but besides this he went with his temporary master to Gallabat, Gedaref and Wad Medani on the Blue Nile, at any one of which places, as also at Kassala, where he was stationed, he may have independently acquired the disease.

When he returned in September, 1916, to his original master at Khartoum North he probably had had the disease three or four months.

On November 1 when I saw him he was a well-marked, advanced case of kala-azar, jaundiced, anæmic, with wasted extremities and protuberant belly, legs œdematous, ribs showing prominently, ascites, and obviously enlarged liver and spleen. (Spleen was $7\frac{1}{2}$ in. below the costal arch.) Extremely weak, with albumin present in the urine, and, of course, bile pigment also.

Leishman-Donovan bodies were abundant in the smear from splenic puncture.

I emphasize all these things because I think that his case was too far advanced for the treatment; in other words, he was so weak that he could not stand the depressing effect of the antimony tartrate.

On November 25 I commenced intravenous injection of a 1 per cent. solution of antimony tartrate, beginning (as advised by E. Muir) with 3 c.c., two days later 4 c.c., and an increase daily of 1 c.c. up to 11 c.c.

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[1] Sir Leonard Rogers (*Ind. Med. Gaz.*, October, 1915)—"It is unfortunate that the method is dependent on facilities for and skill in giving intravenous injections which will greatly limit its employment on a large scale in dispensary and village practice in India." [The same applies to the Sudan. In a country such as the Sudan, where there is no prejudice against the Government medical man, but where natives judge solely from results, it is necessary not to jeopardize confidence in treatment by indiscriminate use of a remedy in every case, regardless of the question of suitability or otherwise.—J.B.C.]

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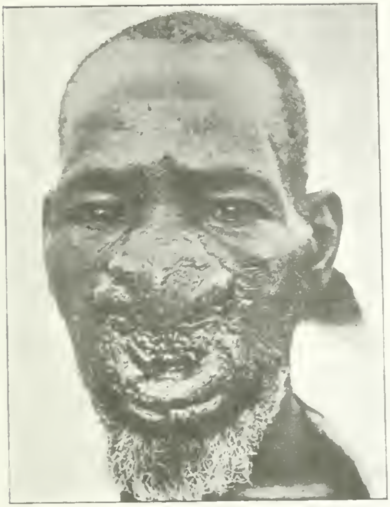

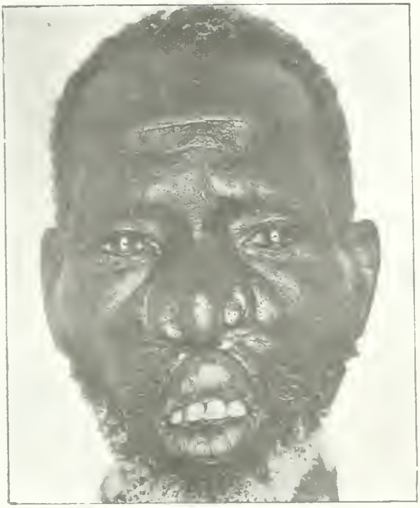

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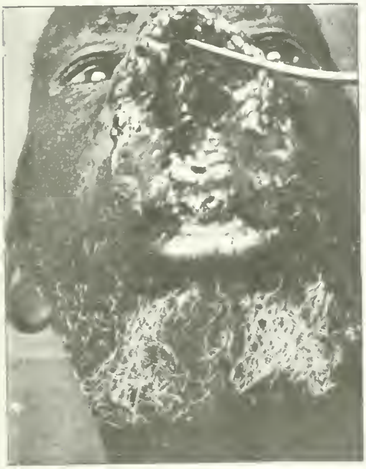

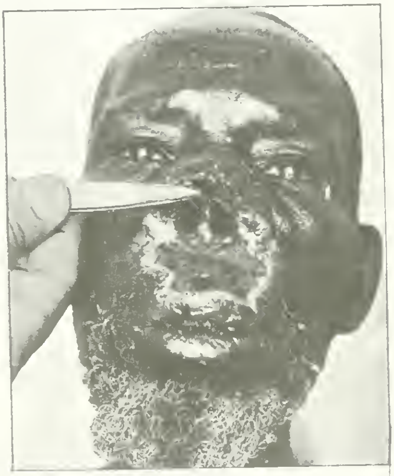

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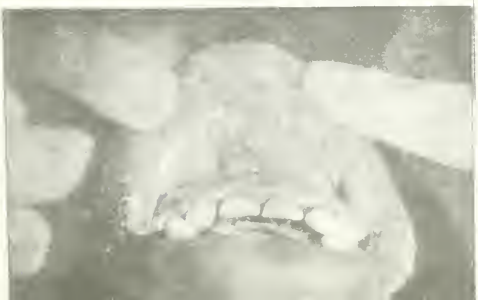
FIG. 1.—Before Treatment.
FIG. 2.—After 5 weeks' treatment, almost cured.
FIG. 3. Showing ulceration inside nose, before treatment.
FIG. 4.—Showing effects of 3 weeks' treatment.
FIG. 5.—Loose teeth. Deep grooves of ulceration round front teeth.

To illustrate paper, "Notes on a Case of Espundia (Naso-oral Leishmaniasis) and three cases of Kala azar in the Sudan treated by the intravenous injection of antimonium tartaratum," by J. B. CHRISTOPHERSON, M.A., M.D.Camb., F.R.C.P.Lond., F.R.C.S.Eng.



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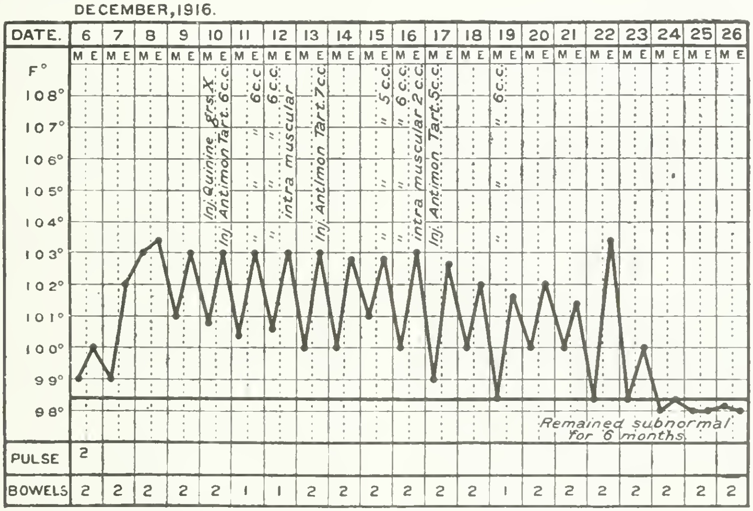
He had thirteen daily injections in all, and the spleen seemed to diminish in size, and the temperature chart showed a very gratifying tendency to fall. On December 12 he had his injection at 12 p.m., and he died suddenly whilst sitting up in bed using the bed-pan. I assume that he had a sudden attack of syncope due to strain on the flabby heart causing dilatation.

Judging from the diminution in the size of the spleen which followed the injections, and regarding the temperature chart, which showed at first, after a temporary depression and a (?) reaction to 105° F., a steady decline to normal on about the fifteenth day after the first injection, I should say that the injections were doing their work.

Originally he came from Hodeidah (Arabia), crossing over to Erythrea, where he stayed four years. From Erythrea he came to Gedaref in the Sudan, where he remained for three years, thence to Wad Medani on the Blue Nile, stayed six days there, and came to Khartoum, where he had been for eleven days. He had, in fact, passed through and tarried in the kala-azar districts of the Sudan.

Besides anæmia he had no physical signs of interest; he was not jaundiced.

Having watched him for a few days and found nothing of interest in his peripheral blood, no malaria or L.-D. bodies on October 31, the spleen was punctured with negative result also on November 5.



Case of Kala-azar treated with intravenous injections of Antimonium Tartaratum 1 per cent. solution. Temperature reached normal about fifteenth day after first injection, and remained subnormal for six months.

If I had such a case again I should hesitate to try the remedy—the case was too advanced—unless I could get efficient nursing, such as one finds at St. Bartholomew's the Great in London, but which one cannot as yet aspire to at St. Bartholomew's the Less in Khartoum.

(2) The second and successful case was Mahommed Yehya, a native of Yeman (Arabia), aged 32, admitted to Khartoum Civil Hospital October 26, 1916, with headache, pains all over the body, and a temperature of 103° F. He suffered from chills and sweats nearly every day. He had an obviously enlarged liver and spleen 4 in. below costal arch, with ascites.

He was weak, his extremities were wasted.

Between November 15 and December 4 (a fortnight and three days) he had an interval during which he was practically free from fever, but the temperature rose again on December 5, and again resumed the irregular type characteristic of kala-azar.

On December 10, 1916, a splenic puncture was again made, and this time the result was positive, and the diagnosis of kala-azar was definitely established.

Treatment commenced December 10, 1916, and was completed June 6, 1917.

No Leishman-Donovan bodies were found on February 7, 1917, nor on three occasions afterwards (on splenic puncture).

Total quantity antimonium tartrate 40 gr. in twenty-four injections.

Every day ...	7 injections	in December, 1916		Total gr. 8
,, other day	3	,,	in April, 1917 ..	,, gr. 4
,, ,, ,,	11	,,	in May, 1917 ...	,, gr. 22
,, third ,,	3	,,	in June, 1917 ...	,, gr. 6
				Total grains 40

Temperature reached normal fourteen days after commencement of injections and remained there—that is, after patient had had 8 gr. of antimony tartrate.

Weight.—Patient was weighed on January 14—8 st. 3 lb. (one month after treatment). He was not weighed before, although he was very thin and weak, this was unfortunate. However, on his discharge in June he was 9 st. 8 lb., so he gained 1 st. 5 lb. in three months.

Spleen was 5 in. below costal arch before treatment commenced; at discharge it was only just felt on deep inspiration.

In order to effect the reduction of the spleen, which became stationary after a time and not inclined to diminish more than 4 in. below costal arch (January 15, 1917—May 12, 1917). From May 5, 1917 to about May 19, 1917, quinine 20 gr. were given daily, and this had the effect of making the spleen contract to almost normal dimensions.

Note.—Peripheral blood had been examined daily in December, 1916, for seven days for malaria with negative result.

When 15 c.c. of a 1 per cent. solution was reached, giddiness, cough, metallic taste, congestion of conjunctiva occurred, and sensation of itching all over body. This is the second course of treatment after starting from 10 c.c. (2 gr. of tartar emetic seemed to be his limit).

This was an ordinary well-marked case of kala-azar, with plenty of Leishman-Donovan bodies in the spleen after being once found.

I reproduce his photo, taken June 10. The Leishman-Donovan bodies are no longer present in the splenic smear; the liver and spleen are quite normal, so far as can be made out by physical examination; the temperature is normal, and has been for six months; the patient is stout; he has put on 1 st. 5 lb., and looks lively and not depressed and glum as before. In fact, he has about him no symptoms of kala-azar and feels quite well. His hair, however, has gone grey.

The third case of kala-azar (a woman) was admitted to hospital as pneumonia (which she undoubtedly had) in the left base behind.

A low form of pneumonia, for which she had been admitted about six weeks previously and had apparently got well enough to go home, though only to return to hospital again. She had very little enlargement of the liver, and her spleen, though enlarged, was not very much so.

I am inclined to think that the pneumonia was a kala-azar pneumonia, and due to the invasion of the base of the left lung by the Leishman-Donovan bodies. This could not be demonstrated because, although a post-mortem was made, no Leishman-Donovan bodies could then be found in the liver, spleen, or lungs. (As a matter of fact, unless the post-mortem in a case of kala-azar is made immediately after death the L.-D. bodies disappear, they are fragile. I may say that L.-D. bodies were found several times in the splenic smears before death, and, in spite of the pneumonia, the temperature chart was very suggestive of kala-azar.

Patient was weak and anæmic, though not jaundiced, nor had she œdema of the legs, and very little, if any, ascites. Clinically she was not a severe case of kala-azar, but she had pneumonia.[1]

On May 7, 1917, 5 c.c. of a 1 per cent. solution tartar emetic was given intravenously. This appeared thoroughly to stir up the kala-azar.

On the following day another 6 c.c. of a 1 per cent. solution was given.

She died at 11.30 p.m. the following day, May 9, 1917.

I have recorded the failures with the successes because I consider they are equally important and interesting. This case had penumonia, in itself a very serious complication of kala-azar [18], and which I think contra-indicates the administration of tartar emetic.

The patient had a very marked reaction after the first dose of 5 c.c. of a 1 per cent. solution, a rigor, and the temperature rose to 104° F. After the second dose on the following day another marked rigor occurred, and rise of temperature to 105° F.

Some observers might say reaction was due to quantity of fluid injected (Borja and Amaral [1]), or perhaps to impurity in the salt used (Muir). I think, however, that these rises of temperature indicate action and reaction between the tartar emetic and the pneumonia.[2]

With regard to the case of *naso-oral leishmaniasis*, such a case is particularly favourable for investigating the effects of treatment. It was a very obvious and severe lesion; the Leishman-Donovan bodies were easily demonstrated in lips, nose, and in mouth.

I had a photo taken in February, and for purposes of comparison it was invaluable. The photo of the man, taken four months later at the time of his admission into Khartoum Civil Hospital (fig. 1), shows the condition was worse than before, still with Leishman-Donovan bodies plentiful.[3]

The photo (fig. 4) was taken three weeks after he had been having injections of tartrate of antimony.

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[1] A very fatal complication of kala-azar.

[2] The injection of tartar emetic into the veins of a healthy person does not raise the temperature, nor does the injection of 5 c.c. or 10 c.c. of fluid into the veins of a kala-azar patient.

[3] A good method to demonstrate Leishman-Donovan bodies in such cases is to take a fine capillary glass tube, pierce the skin at the margin and work the tube into the base of the sore beneath the surface of the ulcer, and stain the serum which collects in the lumen with Leishman's stain.

The disease is well on the road to cure, and it seems certain that the effect of the tartrate of antimony on the naso-oral leishmaniasis has been decisive and specific.

I think I may say that in the Sudan the treatment of diseases due to Leishman-Donovan bodies with intravenous injection of tartrate of antimony has met with the success which has attended this treatment of leishmaniasis elsewhere.

The history of the treatment of leishmaniasis by the intravenous injection of antimony tartrate appears to be as follows:—

Some time before August, 1914, the publication of Gaspar Vianna's[1] sucessful treatment of Leishmania in Brazil by the intravenous injection of tartar emetic led G. di Cristani and G. Caronia in Sicily to try the same treatment in cases of infantile leishmania.

They published their results in an article[2] which was translated in the *Tropical Diseases Bulletin* for April, 1915 (original article *Bull. Soc. Path. Exot.*, February, 1915).[3]

Seeing this review of Cristani and Caronia's article, E. Muir[4] commenced a series of trials of the treatment in cases of adult leishmaniasis in the Hooghley and Bardwan district of India, and confirmed their results. In the meantime and independently Sir L. Rogers had commenced precisely similar treatment in cases of Indian kala-azar, basing his hope on the success reported by Ranken in the Sudan in 1913 in some cases of the closely allied sleeping sickness. Various investigators (see references at end of article) have tried and confirmed Cristani and Caronia's conclusion, and Sir L. Rogers, writing in the *Lancet*, 1916, ii, p. 782, that he regards the drug as an absolute specific.

I should like to add a few notes which may be useful to practitioners in out-of-the-way places who may come across kala-azar, and who will naturally wish to try the intravenous treatment by means of antimony.

It might be thought from the writings of skilful and experienced workers that the treatment is easy, sure of success, and free from danger. These ideas may cause less practised triers to think that the treatment does not require judgment, careful attention to detail, and intelligent practice.

Kala-azar in the Sudan occurs chiefly in districts where there are no dispensaries, few hospitals, and the medical officers of which have not always had the advantage of special training in laboratory methods.

The Sudanese people likewise, although confiding and amenable in the first place, are timid and easily discouraged by non-success, and are naturally apt to think that if a patient dies under treatment the treatment necessarily is not good, so that this is not a method of treatment which may be recklessly adopted without careful consideration in a country such as the Sudan.

The medical officer should in the first place make up his mind whether the case is a suitable one for treatment, and in the second whether he has the facilities for carrying out the necessary technique with success, and I think the following points are worthy of consideration.

SPLENIC PUNCTURE IN KALA-AZAR.

The spleen[1] will probably be punctured[2] [3] several times not only for diagnosis initially, but during treatment for estimating progress. Sir Patrick Manson [17] gives a timely warning regarding splenic puncture. In the Tropics this small but important operation is often treated with too little respect, while perhaps at home it is regarded with exaggerated importance. I have never myself seen harmful results from puncturing either liver or spleen, although undoubtedly such results have occurred, especially with the spleen—a spleen enlarged from leukæmia would not be a safe one to puncture.

Besides having the syringe perfectly aseptic and dry, it is as well to have a long needle (2½ in.) with a bore large (for a hypodermic syringe needle).

The skin should be sterilized with iodine, and it is well to have the patient on a table and not on a bed. The needle should not be plunged but pushed steadily into the enlarged spleen (if not very much enlarged it is well to have marked it out beforehand). When the point has gone far enough it may be rotated a little—gently—in order to break up a little of the spleen pulp, the needle slightly withdrawn, and then enough blood taken up to fill the needle only.

The slide should be very clean, free from grease, and dry. Kala-azar blood is not easy to spread.

The patient should be carried, and not walk, back to bed.

In making these remarks my only idea is to emphasize the point that splenic puncture should be performed with great care. I have seen it done as if the spleen was a pincushion.

All cases should not be treated by this intravenous method. The death of two of my cases seems to indicate that all cases of kala-azar are not suited to the treatment.

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[1] Marchade, Vianna, Carini, all working in South America, obtained excellent results. (G. C. Low, THE JOURNAL OF TROPICAL MEDICINE AND HYGIENE, November 15, 1915.)

[2] It was also translated in THE JOURNAL OF TROPICAL MEDICINE AND HYGIENE, May 15, 1915.

[3] Cristani and Caronia quickly came to the conclusion (and pointed it out in February, 1915) that "In tartar emetic will be found a specific remedy for the therapeutic treatment of internal leishmaniasis."

[4] Castellani, in Ceylon (THE JOURNAL OF TROPICAL MEDICINE AND HYGIENE, May 15, 1915), publishes a case of kala-azar which he had successfully treated with intravenous injections containing tartar emetic.

[1] It is said to be safer to puncture the liver than the spleen. Personally, I think if due care be taken the question of safety does not arise, as it is a small but necessary operation.

[2] In most cases of kala-azar the peripheral blood if examined will be searched in vain for Leishman-Donovan bodies.

[3] It is possible to diagnose kala-azar from clinical signs alone as Muragcsan (18) shows, but the infallible sign is the Leishman-Donovan body in the splenic smear.

One had pneumonia and one was too far advanced. Both died, death accelerated by the treatment.

Pneumonia itself is a very fatal complication of kala-azar, and contra-indicates the use of tartar emetic on account of its irritant action on the lungs, so bronchitis and broncho-pneumonia contra-indicate. I think, too, that when the stage of œdema, jaundice, and prostration has been reached intravenous injection of tartar emetic is not only useless but harmful. Muir [16], however, says that many cases recover under the treatment, even from the stage of œdema, dysenteric symptoms and cancrum oris.

With respect to this, one may observe that it is justifiable to take greater risks in a good hospital where a patient can be watched, and where there are more facilities for nursing than in an out-station, where there is only one skilled workman, namely, the doctor, or at a dispensary, where there is only out-patient treatment.

Nephritis, *severe diarrhœa*, contra-indicate. For children, small and thin and ill-nourished. Cavonia [4] advocates the use of an organic compound of antimony given intramuscularly—acetyl-p-amino-phenol-stibiate of sodium.

Rogers [23] suggests inunction of 5 per cent. finely divided metallic antimony for very young children and perhaps in out-patient and dispensary practice (*Brit. Med. Journ.*, February, 1916).

It is, I think, clear that, although the intravenous injection of tartar emetic is a specific in cases of kala-azar it should be used with judgment, and in treating a case it may be well to bear in mind the therapeutics of antimony and its derivative, tartar emetic.[1] Tartar emetic was once a popular and fashionable drug with the medical profession, but it was over used and abused, and given in such large doses that it fell into disrepute and, finally, into complete disuse. As the remedy will be tried in out-stations and places where books of reference are scarce (medical paraphernalia also—I have in mind the Sudan especially), these few points concerning the therapeutical use of tartar emetic may be of use to those trying the drug for kala-azar.[2]

In kala-azar the patient is weak and very ill, irritable, and responds readily to the action of the drug, therefore it is necessary to administer it with care.

Tartar emetic[3] is antimonium tartaratum, potassic tartrate of antimony of the B.P. Its taste is "at first sweet and then nauseous, and then metallic." Its official dose is:—

As a diaphoretic ...	gr. $\frac{1}{24}$—$\frac{1}{8}$
As an emetic	gr. $\frac{1}{2}$—i.

Its emetic action should be borne in mind, as vomiting sometimes occurs almost immediately on injection, especially if administered on an empty stomach. Tartar emetic is an irritant. In injections there is local pain, and pain up the course of the vein if used in too strong solution, ½ gr. to 20 minims distilled water being quite strong enough. If by chance the point of the needle is not within the lumen of the vein, and the solution consequently is injected around the vein, phlebitis follows and necrosis of the neighbouring tissues (not an abscess).

Another evidence of its irritating action—also evidence of its far-reaching and penetrating power—is its effect on the lungs. During the injection the patient will often have a little attack of coughing. It is this irritating action on the lungs which contra-indicates its use in cases complicated by pneumonia, bronchitis, and nephritis.

Its penetrating power is great. After death by poisoning it is found (Hale White) in *all* organs and in the blood, and it is well to remember that as its elimination is slow, its beneficial effects will be felt probably for months after administration.[1]

Tartar emetic has a depressing action on the heart, directly on the heart, slowing the pulse, dilating the arteries, and causing a fall in blood pressure. This is demonstrated practically by giddiness and faintness. It produces great muscular ralaxation, sweating, salivation, and prostation. This should be remembered, for there is marked prostration and weakness associated with kala-azar.

Temperature.—The physiological effect of tartar emetic on the temperature of a healthy man is either *nil* or one of depression.

The immediate effect of an injection of tartar emetic on a kala-azar patient will be probably to send the temperature up, with perhaps a rigor, to (sometimes) 104° F. or 105° F., and then a big drop,[2] with another rise next dose. The more remote effect after a series of injections is to reduce the temperature by lysis to normal in about fourteen days (within a month, Rogers), where it remains as a rule.[3]

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[1] Hale White. "Text-book of Pharmacology and Therapeutics."

[2] Equal circumspection is not so necessary in the case of cutaneous and muco-cutaneous leishmaniasis. In these one has practically only to consider the local effects of the drug and the difficulties common to all intravenous injections.

[3] Metallic antimony (intravenous injections of) have been tried by Castellani, Bramachari, Rai Harenath Ghosh, Muir, on the ground that it is eliminated less rapidly than the soluble salts, and therefore its action is more prolonged and permanent. Sod. ant. tartrate has also been used for intravenous injections.

[1] Sir Leonard Rogers. "Some patients seen months after discharge from the hospital with their spleens still enlarged, and at a later date it had disappeared beneath the ribs."

[2] This disturbance of the temperature chart after injection has been attributed to impurities in the commercial salt (Muir), or to the quantity of the menstruum (solution too dilute), Borja and Amaral [1]; and to obviate this the latter workers use a stronger solution, 4 per cent., injecting however the same amount of the drug.

[3] "Temperature reaches normal after 5-12 doses of 5 c.c. of a 2 per cent. solution" (Rogers).

Hale White states that the toxic dose of tartar emetic cannot be fixed—it depends on the general condition and state of the individual. Probably the toxic dose for a kala-azar patient is a smaller one than ordinarily and varies according to his general condition, and so the use of the drug empirically is to be discouraged.

There is one thing in this connection which is useful to remember—a tolerance for the drug is easily established, so that the initial dose can be rapidly increased if necessary. Patients sometimes complain of metallic taste in the throat lasting for an hour or two, formication of skin of body, cough coming on during injection, suffusion of the conjunctiva, giddiness and vomiting—these are the indications of slight toxicity ("sickness is the most important toxic symptom," Rogers). Faintness, collapse, diarrhœa, rigors, are more serious symptoms, and indicate that the safe dose has been exceeded.

What is the action of tartar emetic in leishmaniasis? It seems to be generally agreed that it is a direct or specific one on the Leishman-Donovan organism.[1]

Vianna, (G)[2] for cutaneous leishmaniasis used a solution of the strength of 1 per cent. tartar emetic in physiological salt. This was also the strength of the solution used by Rankin[3] in the Sudan when trying it for cases of sleeping sickness.

Muir [16] advises a 1 per cent. solution, commencing with 3 c.c. (contains nearly $\frac{1}{2}$ gr. tartar emetic). He injects every other day, increasing 1 c.c. at each injection up to 10 c.c. ($1\frac{1}{2}$ gr.), continuing till the temperature remains normal for a month and then once a week for two months more.[4]

Rogers [25] has adopted a 2 per cent. solution, and commences with 4 c.c. (contains approximately $1\frac{1}{3}$ gr. tartar emetic). He increases to 6 c.c, $1\frac{4}{5}$ gr.) on the second dose, and adds 1 c.c. ($\frac{1}{3}$ gr.) each subsequent dose if no toxic symptoms intervene, dose given every two (later three) days, maximum dose 10 c.c. (= 3 gr.), treatment continued for several weeks to two or three months after the fever has ceased.

The body weight increases, the spleen is considerably reduced, the blood reaches normal as regards both red and white corpuscles, and the parasites disappear from the liver and spleen.

Personally, I am inclined to think that, considering the difficulties which may be encountered in the operation of introducing the drug into the lumen of the vein in kala-azar patients, the smaller the quantity of fluid[1] and, therefore, the smaller the syringe and needle required, the better, and therefore quantities which can be introduced with a hypodermic syringe with a rather large hypodermic needle are the most convenient.

Stronger solutions than $\frac{1}{2}$ gr. to 20 minims of distilled water are liable to be irritating (1 gr. tartar emetic to 40 minims sterile normal salt solution, or distilled water, can conveniently be made up and kept in a flask).[2]

As routine treatment 20 minims of such a solution may be injected, and if this is well stood may be increased to 40 minims on the following day, and then every other day an increase of 10 minims each dose till 2 gr. is reached. This for a couple of months, and then once a week for some time after. For practical purposes 3 gr. may be taken as the maximum dose.

The most noticeable clinical sign I think is the change in the native patient's skin from the dark, dirty, dry appearance characteristic of kala-azar patients, as if they had been washed with dirty water, to the normal, moist, sleek, supple condition. Muir says that after one injection there is a marked improvement, and after the second a consuming appetite and decrease in spleen.

Increase in body weight is very noticeable. Rogers regards this as the most remarkable and promising feature of the treatment, although he says that body weight may be lost owing to repeated sickness from too large doses.

Temperature falling by lysis commences to fall a day or two after commencing injections, and reaches and remains at normal in about a fortnight.

Finally, with regard to the actual injection of tartar emetic, it must be remembered that it is into the lumen of the vein that the injection must go and not around or about the vein. In my experience this is not always an easy matter. Kala-azar patients are not always favourable subjects for this operation, particularly children, and no structures vary so much in size and distribution as the superficial veins. In the Tropics the worker has to make the best use he can of the apparatus he has at hand—syringes, needles, tourniquet appliances—and he must be prepared for contingencies and think out his procedure beforehand.

In this paper I have tried to draw attention to the difficulties which will present themselves in this treatment to the practitioner who has not the advantages of working in a well equipped hospital. They can often be overcome by care and forethought, it is true, but it is to be regretted that, with sterling remedies such as antimony, quinine, salvarsan, emetine, &c., at hand, the real economic value of hospitals well equipped with staff and apparatus where such specifics could be used with such signal success is not yet duly appreciated by the administrative authorities of our Colonies and Dependencies.

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[1] Jemma, R. [12]. "Begins with plaso-lysis of the cell body, goes on to a neucleo-lysis, and, finally, the blepharoblast disappears. The liver showing the first action, then the bone marrow, and then the spleen."

"The parasites diminish and in some cases appear small and shrunken, as is often the case in patients on the road to recovery" (Rogers).

[2] It seems to have been applied first to leishmaniasis by South American workers, amongst whom were Machado, Vianna and Carini.

[2] Intravenous injections of tartar emetic have been used for other things—Breuil (1911) for yaws, Rankin (1913) for sleeping sickness, Aragao and Vianna for ulcerating granuloma of the pudenda, &c.

[4] The drug may at the same time be given by the mouth: tartar emetic gr. i, tannic acid gr. iii, sod. bicarb. gr. iv.

[1] Brojo and Amaral (1): "Use a 4 per cent., injecting the same amount of tartar emetic in a smaller amount of fluid." This they say obviates rises of temperature.

[2] Martindale makes up convenient ampoules, each containing tartar emetic $\frac{1}{2}$ gr. to 20 minims of medium.

Khartoum,
July 1, 1917.

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GENERALIZED VACCINIA IN SUDAN NATIVES.

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AND

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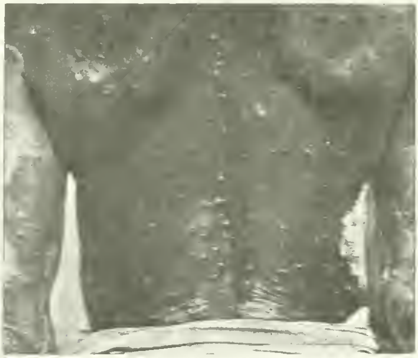
Contents. — *Introductory — Typical Vaccinia — Generalized Vaccinia—Mild Case—Severe Case—Remarks—Illustrations.*

Introductory.—In a short paper published in this Journal on May 16, 1914, Chalmers and Byam described an outbreak of "*vaccine lichen in Sudan natives*," and at the same time drew attention to the fact that there was hardly any literature on, and as far as they knew no illustrations of, vaccine eruptions in native races.

It is unnecessary for us to again recapitulate the literature on the subject, as this can easily be obtained by a perusal of the paper mentioned above, but we must again invite especial attention to the very excellent paper written by Hill and Ross on "*Epidemic Generalized Vaccinia*" in Natal, and published in the *Journal of Hygiene* for August, 1910, as this is, so far as we know, the only paper on this subject in native races.

Typical Vaccinia.—As some 50,000 native vaccinations with calf vaccine, obtained from the laboratories of the Egyptian Public Health Department, Cairo, had to be performed in people, many of whom had never been vaccinated before, and whose ancestors had probably never been vaccinated, it appeared to us that some illustrations of a typical vaccination as seen in these people might possibly be useful. We have depicted such a typical vaccinia without complications, and as seen on the eighth and fifteenth days, in figs. 6 and 7, both of which may with advantage be examined by means of a reading lens.

Generalized Vaccinia.—As generalized vaccinia,



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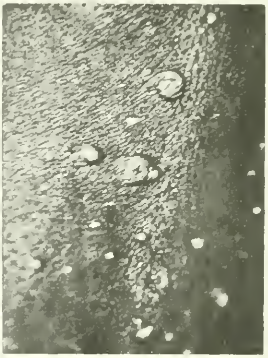

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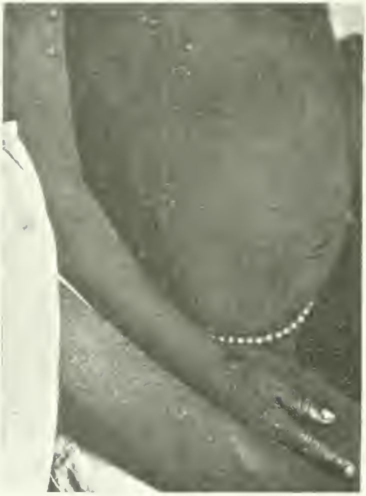

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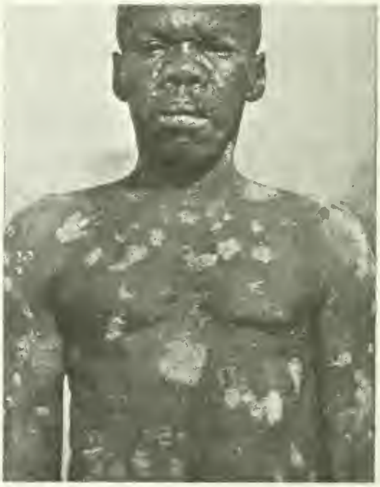

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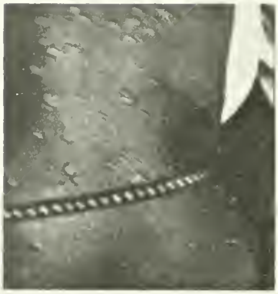

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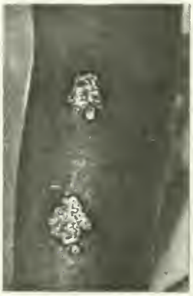

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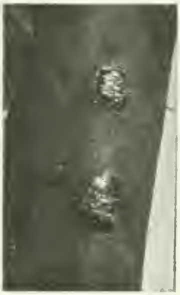

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To illustrate paper, ' Generalized Vaccinia in Sudan Natives," by Albert J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain R. G. Archibald, M.B., D.S.O., R.A.M.C.

judging by the paucity of the literature on the subject, appears to be rare, it may be interesting to note that several of these cases have been observed during the course of the large number of vaccinations mentioned above, and we have chosen two as illustrative of the condition.

Mild Case.—The first and milder case appeared in a young child aged about 5 years. This child was vaccinated on April 22. The vaccine took well, but a generalized eruption began to appear on May 4, i.e., twelve days after vaccination. Three days later, when the rash was fully developed, he was very kindly brought to the laboratories by Dr. Bousfield, Medical Officer of Health, Khartoum.

The rash was vesicular and not umbilicated, and appeared much more densely on the back (fig. 5) than on other parts of the body (fig. 3), being almost absent on the abdomen. For three days the eruption remained well defined, and then the vesicles dried up and disappeared in another three days, leaving no scars. In all the rash lasted nine days, and during the last six days the child did not suffer from fever, though it is not possible to state whether there was, or was not, fever prior to the appearance of the rash.

To summarize: The generalized vaccinia appeared twelve days after vaccination, and lasted nine days, during which the patient was at no time really indisposed, while the only symptom present was slight itching.

Severe Case.—The second and more severe case took place in an elderly riverain Sudanese man, who was vaccinated on May 2 and took well.

On May 24, i.e., on the twenty-second day after vaccination, he suffered from fever, and on May 25 a generalized papular rash appeared scattered over his face, arms, trunk, and legs down to about the knees. This rash continued to come out in crops for several days.

On May 31 the papules had become vesicles, and on June 1 there were definite signs of umbilication, and the general appearance of the eruption was not unlike a very mild case of varioloid (figs. 1 and 4). In fig. 4 the mud is left *in situ* to illustrate native therapeutic methods, but the vesicles are clearly visible if the photograph is examined by means of a reading lens. One vesicle was seen on his palate, but none on his gums or on the mucosa of the mouth.

On June 4 many of these vesicles had increased in size and become markedly umbilicated pustules (fig. 2), and by June 9 these had produced scabs, many of which had fallen off, leaving little depressed raw areas, which in our opinion will form in due course small depressed scars. The man, however, is now quite well and is returning to his work, and in all probability we shall see him no more.

To summarize: The generalized vaccinia appeared twenty-two days after vaccination, required some six days to reach its full height, and another eight days to decline to the stage when the scabs were thrown off.

Remarks.—The second is a much more severe case than the first, with respect to general constitutional symptoms, the extent and the density of the rash, the formation of umbilicated pustules, while it was followed by scabs and raw depressed areas which probably will produce depressed scars.

We never came across any case with really serious symptoms, nor did we hear of any death being caused by generalized vaccinia.

With regard to the cases which we have seen, they appear to depend upon personal idiosyncrasy, and in our opinion not upon climate, nor the method of storing the lymph, nor upon any particular tube of lymph, and in these respects they resembled the cases of *vaccine lichen* mentioned above.

As syphilis is so extremely common here, we did not attempt any sub-inoculations from our cases.

Special treatment was unnecessary in the cases which we saw.

Khartoum,
June 10, 1917.

ILLUSTRATIONS.

These photographs may, with advantage, be examined by means of a reading lens.

Fig. 1.—Photograph of the back of the man depicted in Fig. 4, but with the mud removed, and taken twenty-nine days after vaccination and six days after the first appearance of the rash.

Fig. 2.—More highly magnified view of some of the pustules, one with marked umbilication taken on the tenth day after the eruption appeared.

Fig. 3.—Small boy with generalized vaccinia on the arm, chest, finger, &c., photograph taken on fifteenth day after vaccination, and when the eruption had probably been out about three days.

Fig. 4.—Front view of the same man whose back is depicted in fig 1 and taken at the same time. A number of small vesicles can be seen, scattered all over the area depicted, if the illustration is examined by means of a reading lens. The mud is left *in situ* to demonstrate native therapeutic measures.

Fig. 5.—Photograph of the back of the small boy depicted in fig 3 and taken at the same time.

Fig. 6.—Typical vaccinia in a Sudanese native as seen on the eighth day.

Fig. 7.—Same vaccinia as that depicted in fig 6 but taken on the fifteenth day.

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Horse chestnuts are being collected in Britain for munition purposes. It is estimated that by every ton of horse chestnuts collected a half ton of wheat is saved. The nuts themselves are, of course, not available for human consumption, but from them is derived a material which takes the place of one which is obtained from grain at present.

Mangrove trees have little commercial uses. Tannic acid available for tanning is found on the bark, and is utilized to some extent. From the juice, dyeing materials are extracted.

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THE JOURNAL OF

Tropical Medicine and Hygiene

OCTOBER 15, 1917.

WAR AND POPULATION.

AT the present moment the male population of Europe is being decimated, and a great deal of anxiety as to the probable consequences is to the fore. The Germans with their usual matter-of-fact, not to say animal-like candour, have been openly discussing the fact, and suggestions as to polygamy and the "official pregnancy" of unmarried women has been the subject of gossip throughout the world. In Britain the scarcity of men and the prospect of this becoming greater has shown itself in the scramble for husbands, amongst the officers and men on leave, by a section of the young women. Hasty weddings are the rule, and the acquaintances of a week or two become man and wife, with what result to their happiness or otherwise remains to be seen. One point already observable is that few of the hastily made brides of the past three years have children. This is a notable fact, unsatisfactory from the point of view of replenishing the stock of men in the country, and yet more calamitous from the moral point of view. Of all moral and spiritual poisons the "no family" agreement between a newly married couple, or still worse when it is frequently bargained for before marriage, and by the woman most frequently, betrays a social evil spelling danger to the race and a pollution of thought and mind which brings their souls to utter destruction.

Leaving the question of the "no family" agreement to the loathsome practices of these moral outcasts, the next phase of married life and family limitation is found in the "one child" understanding between parents. This is all the more common when that child is a son. The lists of deaths of only sons at the Front to be read daily in our newspapers but afford a confirmation of what most observers knew to be the custom in vogue. One used to wonder how the punishment of people who followed the foul teaching of limitation of families would come about. The mills of God grind slowly; outraged Nature is a terrible avenger, and woe to those who dare attempt to thwart or impede the even course and channels of her ways. The Great War has brought the punishment home, and the lone mother's (so often a widow) grief is aggravated when she remembers that the comfort of other children are denied her owing to her own selfish thoughts and practices in the past. It is needless to dwell upon the grief that such a reflection brings to mind, more especially when it was the desire for gaiety, the running after Society functions, and selling oneself to the world instead of following the calling that she was brought into the world to fulfil.

That the Great War was needed to purge the world of persons endowed with minds of so vile a form, may seem far-fetched to those who through so-called civilization in large cities have lost touch with Nature and Nature's laws, but to the right-thinking and the religious-minded Nature's ways are immutable, and woe to those who disobey. The political situations, the diplomatic or parliamentary discussions, the ambitions of peoples or of their rulers, and the thousand and one issues, great and small, which are the antecedents of war, seem small and contemptible in Nature's great scheme of right and wrong, for man and his tricks are but pawns in the diplomacy of Nature to work out her own ends. Wars have always been, and wars will always be until the millennium, for Nature has her work to do, to purify, to stamp out unhygienic ways and degenerate peoples, and to replenish the earth with her own children, to scatter the chaff to the wind and the weeds to destruction.

Whilst placing the "no family" and the "one child" husbands and wives in the limelight, we must be just to those who are childless through no matrimonial fault of their own: such deserve as a rule deep pity. A childless wife, say what she pleases to the contrary, is a miserable woman. As she gets to the forties the desire for a child grows to a passion, and the grand climacteric period is a time of woe, of bitterness, and regrets.

As has been said, it is natural for a woman to have a child, and the want of one is a blight to her existence. Hence the desire of woman for marriage, and never was this more manifest than in the present scramble for what is left of the finest manhood of the nation from the battlefield of France and elsewhere. What use are these young women making of what they gain in the scramble? Are they, for various selfish reasons, following the unnatural practices in vogue before the War began? If so, then their happiness is doomed, and by their warring against Nature they are continuing to create a situation which will lead in the future to a rebellion against Nature—Nature which knows so well how to punish all offenders against her laws.

A few years of war does not cause national deterioration, but only a temporary lessening of the birth-rate; but it is only war prolonged for a generation that engenders deterioration. Losing a million men of between 20 and 35 years of age in, say, three or four years, only deprives a corresponding number of women of husbands, but the youth of the country in another three or four years supplies their places, and in the course of a decade or two the population is replaced. It is different when war continues for well-nigh a generation; the able-bodied men as they came of age in France during the Napoleonic wars were called up for the Army for a period of over twenty-five years (from 1790 to 1815). Only the feebler youths of the community were left, with the result that it took 100 years to regenerate the race and to produce men fit to stand before and drive back the Germanic hordes brought against them.

The thirty years wars denuded Germany of men, so much so that 1648 saw the Westphalian peace owing to exhaustion of the combatants. For two centuries was Germany unable to do more than hold her own against her neighbours, and it was only in the sixties of the nineteenth century that she began to extend her influence beyond her borders.

The present War, in spite of its intensity, if it lasts no longer than, say, five years, will not lead to the degeneracy that prevailed through Europe in the eighteenth century, for it does not deeply affect the generation, but only removes a portion of the available adults, and only temporarily lowers the numbers of the population without sapping the man power of the race.

Another phase of contemplation which the present War calls up is that of over-population. As plants and animals are checked in their overgrowth by nature, now by fires, by parasitic intrusion, by toxins, or by combat, so is man regulated by his environment, and the laws of Nature direct his thoughts and opinions as they determine his actions, shape his diplomacy and control his being. Europe is over-populated to so great an extent that it cannot produce sufficient food to support its peoples, and it wanted the "toxin" of war to lessen it. India and China are over-populated to a greater extent still than Europe, and it is interesting to watch, now that disease amongst them is being lessened in its virulence by recent scientific research and one means of checking over-population removed, what the next method will be. War, it is feared, is the only alternative left; and from the ferment prevailing in both countries it would appear that this solution may soon take place. Were diplomatists to study war from the point of Nature's laws it would afford a key to many difficult problems.

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Annotations.

Epidemic Meningitis in Young Children and Silent Epidemics in Adults (R. Korteweg, *Nederlandsch Tijdschrift voor Geneeskunde*, April 28).—The percentage of epidemic meningitis at different ages as reported differs in various countries. The percentage in young children seems to be always higher in lands where physicians have had more experience with this disease and thus recognize it more readily. In the Oppeln epidemic of 2,916 cases in 1905, 71 per cent. were in children under 8; over 25 per cent. were under 2. In the total 225 reported cases in the Netherlands, 1916, only 26 per cent. were in children under 5. Over 31 per cent. occurred between 19 and 29, the Army medical officers being skilled in its detection. Children with meningitis do not spread the disease themselves; school epidemics are unknown. It is probable that when a second child in a family contracts the disease, it acquired the infection from some intermediate adult host, in which only one of a group of five coccus bearers had been in direct contact with a case of the disease. The coccus bearers form a chain; some of them may lose their cocci as the chain lengthens. This chain of healthy bearers may be called a silent epidemic until it reaches some susceptible person; then the disease flares up. As children are particularly susceptible, they serve as an index of the meningococcus status at the moment. Every case in a child should thus warn of a silent epidemic of bearers.

Differentiation in children is particularly difficult on account of the frequent absence in them of the pathognomonic symptoms. Labial herpes is never seen in children under 3. In children under 3, in hundreds of cases there was no stiffness of the back of the neck during the first week in 63 per cent., and even by the fourth week 21 per cent. still showed no sign of it. In fifteen cases in infants no sign of it was found in the first two weeks. Kernig's sign is scarcely more frequent. An acute onset is also rare in young children, and headache also seems rare and mild; children with epidemic meningitis may sit up in bed and play if only they are left in peace. But they scream at any attempt to take them up or move them. Symptoms of enteritis are also common. When they develop along with general hyperæsthesia, meningitis should be suspected, especially if the fontanels are taut. Vomiting is rare in young infants.

A seven-weeks babe took the breast well, but had been whimpering for three days. There was no vomiting but some diarrhœa, and the fontanels bulged. There was no Kernig sign, but the child cried when touched, and the throat was slightly red. The fifth day there was a little stiffness at the back of the neck, and lumbar puncture revealed meningococci in the fluid. Necropsy the tenth day showed thick pus at the base and in the fourth ventricle. In such cases the retention of consciousness is remarkable. There is little fever, but the pulse is accelerated. Sometimes the course resembles fatal hydrocephalus; sometimes it is abortive, but lumbar puncture gives the clue. In the Oppeln experience, 89 per cent. died of the 229 infants less than a year old. Even under serotherapy Flexner has reported a mortality of 50 per cent. in infants.

A six-months babe had been sick for three weeks with fever, but no vomiting or diarrhœa, the head thrown backward. Meningococci were then found in the lumbar fluid, and the lumbar puncture needle was left in place and of blue-tinted Ringer's fluid 30 c.c. introduced into the right lateral ventricle, gauging it to correspond to the fluid dripping from the lumbar needle. This fluid soon showed the blue tint. Ten c.c. of horse antimeningococcus serum was injected then into the ventricle. A total of 62 c.c. of fluid was evacuated and 40 c.c. introduced. Toward the end of the procedure the type of the respiration changed, possibly from irritation of the respiration centre on the floor of the fourth ventricle under the influence of the phenol in the antiserum. Lumbar puncture followed the next day as the fontanels were bulging. Two days later the ventricle-spinal rinsing was applied again, but the communication was evidently interrupted, so 10 c.c. of serum was injected into the spinal canal, and fluid withdrawn from the ventricle until the pressure was normal. The ventricle was punctured again the next day to relieve the pressure. Improvement was evident, but five days later the temperature ran up, and 35 c.c. still turbid fluid was evacuated by lumbar puncture and 10 c.c. sheep antiserum injected. The next day the ventriculo-lumbar rinsing was repeated for the last time, and the child was dismissed cured after a month's convalescence. In two other cases of epidemic meningitis in young children (6 months and nearly 3 years old) the younger died and the other recovered. Three weeks and four weeks had elapsed before the meningitis had been suspected. The symptoms were vomiting, diarrhœa and fever, the head bent backward, but no convulsions in one case, and high fever, vomiting and diarrhœa in the other. The meningococci in this latter case had probably induced a general sepsis at first, and did not localize on the meninges until the end of the month. When bottle babies are affected they may succumb to the enteritis before the actual menigitis symptoms manifest themselves.

Gangrene of the Gall-bladder (O. Gignozzi, *Policlinico*, No. 5).—A man, aged 39, had had two attacks of gallstone colic during the last seven years. The present attack, with vomiting and febrile onset, lasted forty days before the gall-bladder was removed. It was gangrenous throughout and contained 205 gallstones, but the absence of adhesions and the other findings indicated that the inflammatory process was of comparatively recent date. Omentum completely covered the gall-bladder, and had prevented the escape of gallstones.

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NOTES AND NEWS.

The Egyptian slab, styled the "Metternich Stele," gives an account of remedial measures, partly medical and partly of the nature of magic formulæ and incantations for bites of snakes and stings of insects.

The person bitten, if unconscious, was examined, and if the wound's site was uncertain the body was smelt over. It would seem that the scent of the breath was indicative of the type of reptile inflicting the injury. Once the puncture was located the surgeon sucked the wound, spitting away any matter withdrawn. This process is frequently advised, and as blood is alluded to in all of them it evidently was the practice to make an incision near the puncture to abstract venom commencing to invade the tissues. If the sting was upon a compressible member, that was tightly compressed by the fingers and massage applied with the view of squeezing out the poison. Ligatures were employed to stop the circulation and retard infection. These were of a special kind, of which the physician had a supply, it being important they should be inscribed with magic formulæ. Bandages had such texts upon them, or upon labels attached. One remedy mentioned is a mixture of flour and salt. If the contagion had produced coma, the patient was violently shaken, and various means tried to awaken him. These included mesmeric passes and incantations, which were reported to have been successful when Isis cured Horus from the bite of the animal evil deity, Set.

Original Communications.

ON SOME PECULIAR BODIES FOUND IN THE BLOOD OF CERTAIN AFRICAN SNAKES.

By J. E. L. Johnston, M.B., B.S.Lond., D.T.M. & H.Camb.,
West African Medical Staff.

Whilst examining the blood of twenty snakes in Minna, Nigeria, I found some peculiar bodies present in the erythrocytes of seven, and of these one also showed the presence of hæmocystidium, and one of a hæmogregarine. Of the remaining thirteen, seven also showed infection with hæmocystidium or hæmogregarine (see table).

In each case the blood was taken from the heart, and contamination with other cells was very improbable.

Among the snakes showing the bodies in question were *Echis carinatus* and *Causus rhombeatus*.

Description of the Bodies.

A small spherical hyaline body, appearing in the red cells, taking a clear pale blue with Giemsa's or Leishman's stains, and occasionally showing a more darkly staining spherical centre (Plate A, figs. 2, 3). Associated with this is usually another body, of similar shape but often somewhat smaller—both bodies vary considerably in size—finely granular in appearance, taking a dull red stain. These two bodies, blue and red, may be at some distance from each other, and even on opposite sides of the nucleus of the red cell (Plate A, fig. 3); either may occasionally be present alone (Plate A, figs. 7, 8). The blue body has been noted apparently extra-corpuscular.

Relation to the Affected Erythrocyte.

The erythrocyte as a rule stains somewhat poorly; it may contain vacuoles, one or more (Plate A, fig. 4). The nucleus is often smaller and more rounded than that of a normal cell; it may be apparently degenerating, staining poorly, and showing vacuolation, or it may even be absent (Plate A, figs. 5, 9, 10, 6).

Relation to Leucocytes.

Three of the seven cases showed very marked karyokinesis, some most striking figures being seen (Plate B).

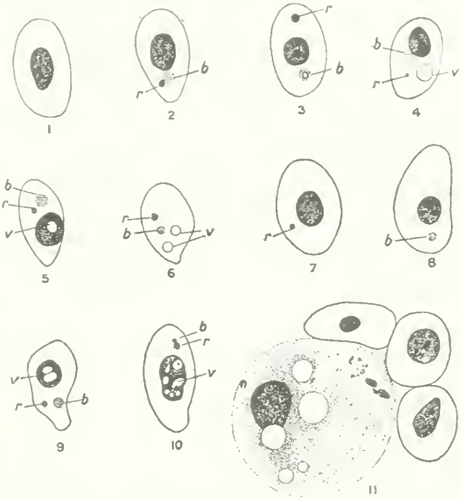
One case showed a few examples of auto-erythro-phagocytosis (Plate A, fig. 11).

It has been put forward by Dr. J. W. Scott Macfie and myself (1913) that this phenomenon may be suggestive of infection with some protozoal organism.

The Nature of the Bodies.

Similar bodies have recently been seen in the blood of snakes on the Gold Coast by Dr. J. W. Scott Macfie and Dr. J. F. Corson, though these observers have not as yet come to any definite conclusion as to their nature.

Plate A.

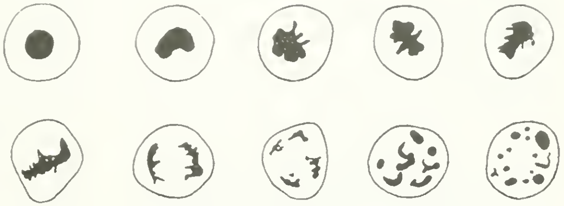


[M. Rhodes, *del.*

r, red body *b*, blue body *v*, vacuole

Magnification = + 1,500.

Plate B.



Leucocytes showing Karyokinesis. [M. Rhodes, *del.*

Magnification = + 1,000.

Dutton, Todd, and Tobey (1907) described an "unidentified parasite" in frogs: "A round red-staining mass from 1·5 to 5·5 microns in diameter is found in red cells. With it are associated bluish-green, crystal-like bodies"—and a parasite of the same type in a snake.

Later França (1910) again described the former parasite, and named it *Toddia bufonis* n.g., n.sp.

It is very doubtful if the bodies I have described above are of a similar nature. The blue-staining bodies are different in form and colour to those figured by França, and the blue colour is at times so faint and translucent as to make one uncertain whether one is dealing with protoplasm or not. One should not, therefore, hold the parasitic nature of these bodies as definitely proved, though it may be considered probable. They may perhaps be a new species, or perhaps some stage in the development of a parasite already described, such as a hæmogregarine.

Their association with blood changes is evidenced by the poor staining, the nuclear degeneration and vacuolation of the red cells, and the marked karyokinesis noted in the leucocytes.

I am much indebted to Lieutenant-Colonel Alcock, C.I.E., I.M.S., for kindly identifying the snakes, and to Dr. J. W. Scott Macfie, West African Medical Staff, for his kind assistance.

TABLE.

Film number	Peculiar bodies	Hæmogregarine	Hæmocystidium	Negative	Remarks
1	+				Marked karyokinesis in white cells
2	+		+		,, ,, ,, ,,
3	+				Bodies very frequent; blue bodies seen extra-corpuscular
4	+				Very scanty; red and blue bodies seen separately
5	+				Auto-erythro-phagocytosis
6	+				Marked karyokinesis in white cells
7	+	+			
8		+			
9		+			
10		+			
11		+			
12		+	+		
13		+			
14			+		
15-20				+	

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THE ÆTIOLOGY OF CRAW-CRAW.

By A. Pijper, M.D.Bethal, Transvaal.
Formerly Assistant for Bacteriology at the University of Leyden.

A Swazi-Kaffir, fresh from his native country, in Ermelo (Transvaal), was found to be suffering from a peculiar sort of skin affection. I have it from a reliable source that this same affection is not at all rare in Swaziland. Seen from a distance the Kaffir showed a striking resemblance to a case of small-pox. On closer examination, however, the difference became apparent. The skin of this individual presented numerous hard papules, varying in size from 3 to 8 mm. On his face the papules are very close together, sometimes touching each other or even confluent. Over the rest of his body the papules are distributed fairly regularly, sometimes standing close together, sometimes at distances of several centimetres. The palms and soles are free from eruptions. The surface of the papules is nearly smooth, the shape is round and fairly flat, they are very hard to the touch, harder than the surrounding skin. Very often they show a darker pigmentation than the rest of the skin. Suppuration is entirely absent, except in the face, but there is no doubt this must be explained as caused by scratching. There is a fairly severe pruritus in the fully developed papules, and the patient complains of a "burning feeling" in his skin, before a new papule arises. So far he has only seen papules coming, but none disappearing. There are a few swollen glands. For the rest nothing abnormal can be found, there is no rise of temperature, and the pulse is 80.

In Castellani and Chalmers' "Manual of Tropical Medicine" [1], Castellani, under the name of "Craw-craw," describes a malady of the skin, "met with in Africa, in Ceylon, and in various parts of the Tropics, characterized by the presence of numerous hard, almost horny papules, occasionally slightly exfoliating at the top, varying in size between a millet seed and a small pea." His further description, too, corresponds accurately with the case referred to here, except in one point. He says that the affection, as a rule, does not affect the face and scalp. This is certainly not the case here, rather the opposite holds true. But still, Castellani's description of craw-craw comes nearest to my findings, and therefore I feel justified in considering my case to be one of craw-craw (nodular dermatitis, Plehn). I must add that Daniels [2], in his book on tropical medicine, refers to craw-craw as a pustular skin eruption, but he does not distinguish between craw-craw and coolie-itch; whilst Castellani very clearly differentiates the one from the other.

Syphilis could be excluded by the absence of spirochætæ in the papules treated after the Levaditi method, in smears from the under-surface of the papules and in sections made in the usual way and stained after Gyenes and Sternberg's method [3]. At the same time potassium iodide had no effect at all.

These considerations lead me to the pathology of the affection. By slipping a sharp spatula halfway under a papule the whole of it is lifted up easily and comes off unbroken. There is slight bleeding, but the patient has but little pain. Smears from the under-surface of the papules show many leucocytes. After hardening and embedding the papules are found to consist mainly of epithelial cells. The papillary layer of the skin shows hyperæmia, and infiltration mainly with polynuclear leucocytes. These cells are seen wandering into the epithelium, causing its outline to look indefinite. The structure of the epithelium is not quite regular; cancroid nests of cells, with their onion-like arrangement, occur. The pigment, which as a rule in negroes' skins is to be found in the basal layer of epithelial cells, is very distinctly to be seen between those cells in strains originating from the papillary layer. All the epithelial cells form one coherent mass, no isolated masses of cells are to be seen. Micro-organisms could not be found, except some ordinary cocci on the superficial layers of the skin (fig. 1).

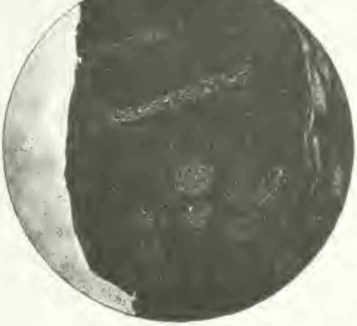

Fig. 1.—Magnification = 70.

In the blood I found 82 per cent. polynuclear leucocytes, of which 14 per cent. belonged to the eosinophil class, and 18 per cent. lymphocytes. No abnormal cells were present. I had no opportunity to ascertain the absolute number of blood cells.

Castellani gives the ætiology of craw-craw as unknown. Nielly's case, in which he found an anguillulina larva, surely was not craw-craw [1], and O'Neill's discovery of a microfilaria has lost its value since we are aware of the enormous frequency of *Filiaria perstans* in the African natives under his observation [4].

As I thought it possible that some fungus was the cause of the complaint, I resolved to work in that direction. I placed small pieces of papules on Sabouraud's agar, and in moist air-cells, after Plaut's method. All these attempts proved negative. More successful, though no fungus was found, were experiments, wherein the special technique was used with which Castellani discovered the cause of *Tinea imbricata;* eight pieces of papules were treated with alcohol for five to ten minutes, and after that placed into glucose-broth tubes, one piece in each tube. Next day seven tubes proved to be contaminated with bacteria, one remained clear for the following five days, then a small white mass was seen adhering to the piece of skin. Gradually small pieces of that growth came loose and formed a sediment in the tube. By shaking up the broth a most peculiar phenomenon was to be seen; granular masses came whirling through the broth, but never were disintegrated so far that the broth became turbid. Microscopically the growth was seen to consist of bacilli very much like those found in diphtheria. In the beginning subcultures only on glucose-agar were successful, those on ordinary agar and broth failed. Later on I have been able to grow these bacteria on all media except gelatine. All media must be alkaline. The best medium tried was Loeffler's serum. An excellent and simple medium for these and many other exacting bacteria is the *bouillon à l'œuf*, as described by Besredka and Jupille [5], and also the agar prepared after the same principles.

On no medium do the colonies ever reach a great size. On glycerine-agar they vary from 1/40 to 1/4 mm. The colonies are always separate, never totally confluent.

The bacteria possess the following characteristics: Polymorph, non-motile bacilli, length from 2 to 5 microns. Form very much like diphtheria-bacilli, slightly curved, slender, with swollen ends, sometimes a swelling in the centre. No spores. They stain very readily with Loeffler's blue. With dilute stains an irregular segmentation becomes visible. Capsules not present. Sometimes very sharply defined roundish granules are to be seen, and always when stained with Neisser's method for diphtheria-bacilli. These granules are present both in young and older cultures. Their distribution in the bacilli corresponds with that described for diphtheria-bacilli, but they are rather more frequent. No other granula. Flagella not present. Branching is not rare. The bacilli are Gram-positive, and not acid-fast. In older cultures degeneration sets in and the bacteria swell up and become one indefinite mass. Under anaerobic conditions only poor cultures could be obtained.

Description of Cultures.

Agar, Glycerine-agar, Glucose-agar. — Colonies faintly yellow, transparent except in the centre, looking like a mass of granules with fringed margin. The surface is very shiny. The colonies are not adherent to the medium. Stab-cultures nothing characteristic.

Gelatine.—No growth.

Loeffler's Serum.—Whitish colonies, corresponding with those on agar.

Broth.—Growth always at bottom. When shaken up granular masses whirl round, but the broth never becomes even slightly turbid. No indol, no H_2S, but acid is formed.

Potato.—With the naked eye nothing can be seen. Still sometimes a growth is present.

Litmus-milk.—No change in reaction.

Milk.—A good growth is obtained. No clotting.

Thiel's Medium.—No change in reaction.

Lactose-broth.—No gas. No acid.

Glucose-broth.—No gas. Formation of acid. Maximum after eighty hours in 5 c.c. broth, corresponding with 2·6 c.c. 1/40no. NaOH.

Dextrine-broth.—No gas. Formation of acid.

Saccharose-broth.—No growth.

Saccharose-broth.—No gas.

It is clear that this bacterium must be classed with diphtheria-bacilli and allied bacteria. As it refuses to grow on gelatine it cannot be identified with the pseudo-diphtheria-bacillus, nor with the bacillus xerosis. The presence of so numerous "metachromatic" granules, even after six hours' growing on Loeffler's medium, already made this improbable. The occurrence of branching forms is another argument. These last two morphological characteristics resemble more those usually described in diphtheria-bacilli. But here the pathogenicity gives a differentiation. Injections of several cubic centimetres broth-culture of this bacterium proved fatal for guinea-pigs, but without any marked symptoms at the place of injection. I must add that after numerous subcultures this pathogenicity became lost.

Notwithstanding many efforts I have not been able to demonstrate bacteria in the original lesions of the Kaffir skin. For this I hold two things responsible. Firstly, the well-known difficulty of staining bacteria in contrast to epithelial cells. But, secondly, I think we may safely assume that, as all the lesions are beautifully round, the pathological process has originated from a centre. It is quite possible that one or two bacteria situated in the centre of a papule are the cause of its development. The close relationship of coryne-bacteria to those of the tuberculosis group make this quite conceivable. And with this assumption the finding of those one or two bacteria becomes practically an impossibility.

In trying to reproduce the human lesions in experimental animals the following results were obtained.

Injections of small quantities of bacteria into the skin of rabbits (preferably of the inner side of the ear to prevent the hair follicles so numerous at other places from obscuring the relations) gave rise to hard nodular swellings after a period of seven to fourteen days. These papules reach a size of 2-4 mm., and often last months. Suppuration only occurs as a scratch effect. Microscopically these lesions are seen to consist to a great extent of epithelial cells. The connective tissue does take very little part. Sometimes the epithelium is hypertrophied all along the path of the injection needle and some sort of implantation cyst is formed, connected, however, with the surface epithelium by a thick string of epithelial cells. As it still remained doubtful whether these nodules were not simple inplantation cysts I verified the results by having recourse to a more natural way of infection. A good quantity of bacteria were injected intravenously into a rabbit. At the same time the skin at the inner side of the ear was injured by scratching it with emery-paper. A fortnight later there appeared again hard nodular swellings. Microscopically these too were seen to consist of epithelial cells (fig. 2).

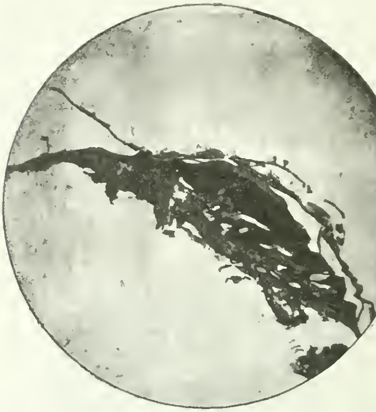

Fig. 2.—Magnification = 25.

These findings make it very probable, if not sure, that this coryne-bacterium is the cause of craw-craw.

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[1] Castellani and Chalmers. "Manual of Tropical Medicine."

[2] Daniels. "Tropical Medicine and Hygiene."

[3] Gyenes and Sternberg. *Berl. klin. Woch.*, 49, 1913.

[4] Fulleborn. "Die Filarien des Menschen," in Kolle und Wassermann's *Handb. d. pathog. Mikroog.*

[5] Besredka and Jupille. *Ann. de l'Inst. Pasteur*, 1914, No. 11.

* * *

A Clean and Comfortable Method of Treating Erysipelas Patients (Milliken, *Ann. Surg.*, August, 1917).—The patient is cleansed and put to bed. Rest is enforced during the acute fever, and for two days after the temperature reaches and remains below 100° F. At the start calomel and salts are given and diet allowed according to the patient's appetite. Fluids are forced during the fever. Stimulants or sedatives are used according to necessity. The entire area involved in the infection is dusted and kept powdered with stearate of zinc (oleostearate B.P.). If incision has to be made into an abscess, wet dressings are applied to the immediate area, but the surrounding area is left thoroughly powdered.

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THE JOURNAL OF

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November 1, 1917.

THE EMPLOYMENT OF WOMEN IN MANUAL WORK.

In tropical countries we are made familiar with women as workers in all branches of labour, and the further we descend in the scale of civilization the fact is still more prominently emphasized. The old idea of man being the warrior and the defender of the house and home remains in many parts of the world. He looks upon labour in the fields as women's work, and regards it as a degrading pursuit for men. The Afghan may occasionally lend a hand to till the soil, but he does not look upon that as being his calling, and leaves it to his womenfolk. It was not until the Afghan, for instance, tasted the pleasures of direct payment for his labour that he was induced to work at all, as occurred when the railways on the borders of his country were being made by the Indian Government, as at Quetta and elsewhere. The daily wage was a new experience in life to him, but once bitten with the possession of money in his pocket he was grieved, not to say angry, when the railway was built and finished and there was no more money to be made. The Red Indian looked to his squaw to produce the cereals whilst he brought in the products of the chase. And so in many countries the man gets or purchases a wife to do the work for him, not only in the house but out of doors as well.

To go no farther afield than Western Europe, the labour on the land was, and in many places still is, carried on largely by women. This during the past quarter of a century has decreased more in Britain than in adjacent countries, for Dutch, French, and Spanish women are in much more evidence in the fields than are British women. In Italy, again, or further East in Europe, the same obtains, and women do more and more outdoor work the farther East one travels. When machinery became a factor in agricultural work women were driven from the fields, for neither the reaper and binder nor the motor plough seemed to come within their sphere.

Recently and with a rush women have again come into the fields in Britain and are helping to till the soil, using machinery or the horse in a manner that shows a capability of reverting to their original calling, and to the aptitude which they once possessed. It is, however, curiously enough a different class of women who have taken up this work. They are no longer the women of the village—the farm labourer's wife and daughters, nor the small tradesman's womenfolk that help in the hay field, hoe turnips, or assist in gathering in the grain. These women have used their "liberty" in a different fashion; too often they have lost all interest in farm life; they have little or no pride in their "basket and in their store"; they will not walk to their neighbouring village to sell their eggs nor to buy their bread; but expect all this to be done by the merchant who scours the district in his motor or pair-horsed van, buying and selling at prices which are lessened when the goods are purchased and heightened when sold, as the vans and the men who drive them have to be paid. The blackberries in the hedges are allowed to wither and rot as they will not take the trouble to gather them, nor take any pride in home-made jams or jellies, as they can buy them in the shops all ready made and delivered at their doors.

This class of the population is hopeless as regards going "back to the land," although they are on it. The women who have come forward for agricultural work are, as a rule, not of the labouring class, but more often "young ladies" from towns who, in their enthusiasm to help in war time or for change and occupation, have taken to it, finding it a pastime rather, and weaving around the work a halo of romance which serves to stimulate them to continue. Whether this will persist is a question, and whether it will pay the farmer to continue to employ them remains to be seen. Both these factors are doubtful, and therefore the stability of the present outburst of women on the present basis as field workers is insecure. Had the labourers' wives taken to the work a permanent good would have resulted, which more than anything else would have helped the farmer and agriculture generally, but the present ephemeral assistance rendered is not likely to last. That it has helped in the present crisis is, however, undoubted, but that it will fructify into a permanent asset in the country's welfare is really an open question. The physical capacity of women for farm work, and whether such employment is beneficial to the race opens other questions which time alone can settle. That a number will increase their physique would seem probable, that a number will ruin their health and unfit them as mothers is certain. It is a question of the survival of the fittest, and seeing that the number of women before the War exceeded by some two million the number of men, and the proportion will be increased by the effects of war, this plethora of possible mothers and scarcity of men is no doubt beneficial up to a point; and were men to select from the really physically fit, the numbers of healthy children would improve. There is thus a prospect of improvement in the health of a large section at any rate of the women. Were the men to elect the physically fit women permanent improvement would be the happy result of the present experiment; but the physical weeds are unfortunately just as often chosen by men as not. The fact is that the physique of the woman as a factor in helping the labourer in the field has not the importance it had when she did her part in sowing, hoeing, or reaping, so that female physical strength has no longer the importance or monetary value for field work it once possessed.

The notices we see in our towns posted by Government authorities, such as "10,000 women wanted for agricultural work," is a most interesting historical, physiological, and hygienic factor. It appeals to the towns-women who are not inured to out-of-door work, and asks them to follow a country life in place of dwelling in towns where excitement is ever present and shop windows attract—to work in the barn, the cowshed, or the pig-stye in place of idling at the piano or in the drawing-room. A revolution indeed, let the issue be what it may.

Annotations.

Poisoning by Belladonna Plaster (B. G. R. Crawford, *Brit. Med. Journ.*, August 11).—A strongly built, muscular labourer, aged 37, at 11 a.m. complained of pain in the back. A belladonna plaster about 6 in by 4½ in. was applied, and he went back to work.

At 2 p.m. he was carried in on a stretcher, delirious and semi-conscious, struggling, and being held by two men. The skin was harsh, dry, and reddened, pupils dilated, pulse 130, and respirations 40; the temperature was unobtainable on account of his movements. The plaster was removed and he was admitted to hospital. The same condition remained more or less until 9 p.m., when he became quieter and sank into an uneasy sleep, the pulse then being 115 and respirations 30. The temperature was 97·5° F. The following morning he was better, the tongue and lips were dry and furred, and speech was slightly incoherent. He had no recollection of what had occurred, and felt quite well, though refusing solid food, and was with difficulty persuaded to take any nourishment. The bowels acted after an aperient, and urine passed naturally was normal.

Two days later the only sign was slightly enlarged pupils acting slowly to accommodation; the patient left feeling perfectly well—pulse, respiration, and skin condition being normal. There was no history of any previous fits or similar illness.

Army Ophthalmic Service.—Cirincione (*Policlinico*, June 10, 1917), after a careful study of the ophthalmic service, suggests that each army should have a central hospital where the soldier with wound or disease of the eye may be immediately sent for proper treatment by experts and not allow the treatment of the eye by an ordinary physician in the general hospital or small eye infirmary. The establishment of one large institution where all the cases should be sent, where separate quarters should be established for the cases of simple ophthalmia, isolating those of gonorrhœal origin, of trachoma, and a separate department for observation and study of cases.

In his rounds he has inspected 50,000 cases; 2,000 of these had induced conjunctivitis, many others had succeeded in aggravating an existing eye trouble. He found 200 cases of loss of one or both eyes from purulent conjunctivitis due to improper care and treated too late by a specialist. Only the qualified specialist should have charge of the cases, for he alone is capable of sifting the factitious cases. The eye affections which should bar from military service and entailing absolute rejection are complete ptosis, covering of the cornea; serious deformity of the lid; permanent obstruction of the lachrymal canals; essential blepharospasm; exophthalmos with cornea protruding not less than 1 cm., enophthalmos, xerosis of the entire conjunctiva; incurable corneal complications of trachoma; detachment of the retina; total opacity of the lens and vision less than $\frac{3}{10}$ of normal for both eyes or when vision in one eye is below $\frac{1}{20}$. Paralytic and cicatricial lagophthalmos, if it cannot be corrected, is a bar to military service. Recruits suffering from trachoma should be isolated in troops and treated in the hospital. Simple conjunctivitis should be treated in the hospitals and entail only temporary incapacity. Blepharitis and keratitis entail only temporary incapacity. Concomitant strabismus is never a cause for exemption. Binocular diplopia and paralytic strabismus may give temporary incapacity.

Typhus Fever (J. Alexander Mitchell, *Medical Journal* of South Africa, July).—For many years before 1886 there have been occasional outbreaks of an infectious fever of anomalous type. They were officially noted in 1900, and under the name of "Black Fever" were noted in the Cape Colony Annual Health Reports of 1907 and 1909. Within the past eighteen months considerable outbreaks have occurred. Several patients have been in hospital; Europeans also have been attacked. The disease has taken on more virulent and typical characters; rash is frequently seen in native cases and in most Europeans. Under careful and continuous observation there is the typical course of typhus from first to last. The principal symptoms are the same—prostration, stupor, or delirium—so that the natives call it Mbetalala, "the disease that strikes and causes to lie flat." The tongue is fissured and covered with black crust, hence the old native name of "Black Fever." The pulse is low or dicrotic.

The rash is "rose spots" first on the chest or abdomen; extends, but avoids the face, palms, and soles; appears on the fourth to seventh day. Subcutaneous mottling—marbling appears on the second or third day. Is best seen in axillæ and groins.

Reflex Anuria (Dr. Crosbie, *Boston Med. Surg. Journ.*, September 27).—A large, florid man, aged 50, with good colour, did not look a bit sick, tongue clean, and mind clear. He had not passed urine for three days. Previous attempts to catheterize failed.

By rectum prostate was not enlarged. Following the examination, the patient passed 2 oz. of bloody urine; then a catheter, passed without difficulty, obtained no urine. I felt that the man was a malingerer. He was a freight handler, and I thought he was probably trying to work the insurance company.

He was put on forced fluids and observation; X-rays were negative; blood pressure, however, was 230. By evening of that day he had not passed any urine. He was put in hot packs and fluids were forced. The next morning conditions were unchanged. Still he was not sick, and his tongue was clean, showing no signs of renal insufficiency. At that time it was five days since he had passed any urine to speak of. By catheterizing both ureters no urine came from either side. The patient still was not very sick. He was etherized, and under ether a mass was felt in the left loin. It was cut down and a tremendously enlarged left kidney was found surrounded by a great deal of inflammation. In the first part of the ureter on that side a stone could be felt. The pelvis was opened, the stone removed, and a nephrostomy done to get free drainage. In removing the stone several ounces of turbid urine came out. The patient then was not in good condition, so nothing further was done. He was put to bed and given salt solution. That night his dressing was soaked, and during the next day. The day following the operation, the patient went into coma and died that night.

The kidneys were both removed, and both showed a chronic inflammation. The right kidney was much better than the left. The left kidney had been blocked off by this stone, but on the right side there was nothing at all to block the outflow of urine. Sections from the right kidney showed a chronic inflammation, but yet there was not the inflammation of an acute nephritis, in which the tubules are blocked with exudate.

It was apparently a case of reflex anuria, not diagnosable under the conditions.

As to the reason why the X-ray was negative: After we took the stone it was X-rayed by itself, and then in a small sac containing water. By itself the stone showed, but as soon as it was surrounded by fluid it did not show at all. That was apparently the reason why we did not find the stone in the X-ray examination. Chemical analysis showed the stone to be pure uric acid.

Reprint.

COMBINED VACCINATION WITH MULTIPLE VACCINES (QUADRUPLE, QUINTUPLE, AND SEXTUPLE).

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AND
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The advantage of using the method of combined vaccinations, introduced by one of us (C.) long ago is at the present time recognized. The triple vaccine—typhoid + paratypoid A + paratyphoid B—for instance, prepared and used by one of us since 1905, has recently been adopted in all the Allied armies, thanks especially to the work of Dreyer, Walker, Gibson, Bassett-Smith, Cumming and Cummins, Widal, Chantemesse, Vincent, Sergent, Nègre, Rho, Conte, Porcelli, and others. There are, however, other combined vaccines which will be found useful, and it is on these vaccines—containing, some of them, four, five, and six species of germs—we desire to make some remarks based on a certain amount of experimental work we have carried out.

TETRAVACCINE No. 1 (T.A.B.C.).

Technique of Preparation.—The growth of twenty-four hours typhoid agar cultures is washed off with sterile 0·85 per cent. salt solution to which 0·5 per cent. carbolic acid has been added; the emulsion so obtained is stored at room temperature for twenty-four hours and then standardized.

In some rare cases, when the emulsion is very thick, twenty-four hours may not be sufficient for the small amount of carbolic present to sterilize it completely; the germs, however, will be non-motile, easily counted, and the addition of carbolic salt solution necessary to standardize the vaccine will quickly kill the germs. To standardize the emulsion the bacilli are counted by using a Thoma-Zeiss apparatus, and sufficient carbolic salt solution is added to reduce the number of germs to 2,000 million per c.c. The standardized emulsion is tested some hours later for sterility. The same procedure is carried out with twenty-four hours old agar cultures of paratyphoid A and paratyphoid B, these two emulsions being standardized to contain 1,000 million organisms per c.c. The above procedure is also carried out with cholera cultures, the emulsion of which, however, is standardized to contain 8,000 million germs per c.c. The four standardized emulsions (when found sterile) are mixed together in equal proportions, and the vaccine will therefore contain per cubic centimetre:—

Typhoid	500 million
Paratyphoid A	250 ,,
Paratyphoid B	250 ,,
Cholera	2,000 ,,

This mixture, which must be tested for sterility, is the combined vaccine. Of this mixture, ½ c.c. is given under the skin of the arm the first time, and the same, or double the amount, a week later.

Blood Examination of Rabbits Inoculated with Tetravaccine No. 1 (T.A.B.C.).

With the assistance of Mendelson, Porcelli, and others we have carried out experiments on seven rabbits, each of which had received two injections of the tetravaccine at a week's interval.

The doses given varied between 0·2 c.c. and 1 c.c.; the production of agglutinins was investigated in all the seven rabbits, and bacteriolysins in three. The amount of antibodies produced did not seem to be in proportion to the amount of vaccine inoculated; this confirmed the old observation made by one of us, that when immunization is obtained by one injection the production of antibodies is not in proportion to the amount of vaccine injected. Provided a sufficient minimum quantity be given, the same amount of agglutinins, bacteriolysins, &c., will be produced whether one, five, or ten times that minimum dose be given.

The four curves showing the agglutinins induced by the injection of tetravaccine in rabbits are practically identical with the curves obtained in control rabbits injected with monovaccines.

As regards bacteriolysins, in the three rabbits examined they were present for the four species of microbes, and did not seem to be present in smaller amount than in control rabbits inoculated with monovaccines.

Blood Examination of Individuals inoculated with the Tetravaccine (T.A.B.C.).

The production of agglutinins for typhoid is large, for paratyphoid A and paratyphoid B satisfactory, for cholera small. The agglutinins present for paratyphoid B are generally in larger amount than for paratyphoid A. The production of agglutinins is not inferior to that found in control individuals inoculated with monovaccines. In fact, not rarely have we noticed that during the first two or three weeks the agglutinins, especially for typhoid and cholera, are in higher amount than in individuals inoculated with monovaccines.

Innocuity of the Tetravaccine (T.A.B.C.).

In Ceylon several thousands of individuals were inoculated in 1913 and 1914, and in Serbia more than 120,000 men were inoculated in 1915 with the tetravaccine by Castellani and Mendelson, Lurie, Mitchell, Shattock, Colonel Randon Head of the French Mission, and others, without any untoward result. It was adopted by the American Red Cross Commission, at the head of which were Drs. R. Strong and T. Jackson. No really serious reaction was ever observed, and the inoculated persons were generally able to attend to their duties in from twenty-four to forty-eight hours after injection. The opinion of the medical men in charge of the troops and of the Serbian authorities was very favourable; so much so that the vaccine has recently been adopted officially for the whole of the Serbian army. As regards results, owing to the unfortunate condition of the country elaborate statistics are unobtainable, but the four diseases have been practically absent from the portion of the Serbian army which was inoculated with this vaccine.

TETRAVACCINE No. 2 (T.A.B.M.).

This vaccine consists of an emulsion in carbolized saline solution (carbolic acid 0·5 per cent., salt solution 0·85 per cent.) of *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, and *M. melitensis*. In the preparation of the vaccine care should be taken to use a strain of *M. melitensis* rich in antigen, otherwise antibodies for this germ may not develop. The technique is the same as that described in the preparation of the Tetravaccine No. 1 (T.A.B.C.), but agar cultures of *M. melitensis* forty-eight hours old should be used. The technique of preparation is the same as that described above. The growth of the typhoid agar cultures is washed off with 0·85 salt solution containing 0·5 per cent. carbolic acid, is stored at room temperature for eighteen to twenty-four hours, and then standardized in such a way that 1 c.c. will contain approximately 2,000 million typhoid bacilli.

The same technique is used to prepare the paratyphoid A and B vaccines, each of these being standardized to contain 1,000 million. The same technique is used to prepare the Malta fever vaccine, but this vaccine is standardized in such a way as to contain 8,000 million per c.c.

After standardizing the four different vaccines and testing their sterility they are mixed together in equal parts. The vaccine will contain per cubic centimetre:—

Typhoid	500	million
Paratyphoid A	250	,,
Paratyphoid B	250	,,
Malta fever	2,000	,,

Of this vaccine 0·5 c.c. is injected subcutaneously in the arm, and a week later the same or double the amount is given.

This vaccine has been used in a fairly large number of persons (over 600). The reaction was hardly higher than after the simple typhoid or mixed paratyphoid A and paratyphoid B vaccines. The blood of all inoculated persons examined (24) developed a large amount of agglutinins for typhoid, paratyphoid A and paratyphoid B, and a certain amount for Malta fever, which, however, in several cases, was very small. The amount of agglutinins produced for each germ was apparently not distinctly less than in control individuals inoculated with simple "one disease" vaccines.

PENTAVACCINE No. 1 (T.A.B.C.P.).

This combined "five diseases" vaccine consists of a carbolized saline emulsion of typhoid, paratyphoid A, and paratyphoid B bacilli, cholera vibrios, and plague bacilli.

Agar cultures twenty-four hours old are used in the case of typhoid, paratyphoid A, paratyphoid B, and cholera; agar cultures three days old are used in the case of plague, as this germ grows slowly. The technique of preparation is the same as that already described. The vaccine is standardized to contain per cubic centimetre:—

B. typhosus	500	million
B. paratyphosus A	250	,,
B. paratyphosus B	250	,,
V. choleræ	2,000	,,
B. pestis	500	,,

Half a cubic centimetre is given the first time and double the amount a week later.

Method of Vaccination.

The inoculation is made subcutaneously in the arm in the same manner as when using simple typhoid vaccine. In strong male adults we give 0·5 c.c. the first time and 1 c.c. a week later; in adults who do not appear to be very strong and also in women half doses are given with apparently the same satisfactory results. Children between 10 and 16 years of age receive about one-third of the adult dose; children below 10 years of age we have not yet inoculated. The inoculation of the vaccine is followed in a few hours by a local reaction (redness and some infiltration) and general reaction (fever, malaise, rheumatic pains), which generally do not incapacitate for work more than twenty-four to forty-eight hours. The reaction may be said to be, as a rule, much more severe than after the inoculation of simple typhoid, or the mixed typhoid, paratyphoid A, paratyphoid B vaccine, or the tetravaccine T.A.B.C., but certainly somewhat less severe, in our experience, than after using Haffkine's monovaccine. It is to be noted that occasionally one comes across individuals who show practically no reaction.

Innocuity of the Pentavaccine No. 1 (T.A.B.C.P.).

In Ceylon four coolies who volunteered were inoculated nine times each at a week's interval. They remained in good general health, though two had somewhat severe general and local reactions. All the individuals inoculated in the Balkanic and Adriatic zones (more than 400), apart from a rather severe reaction, remained in perfect health; they had each two injections—0·5 c.c. the first time, 1 c.c. a week later.

Blood Examination of Rabbits inoculated with Pentavaccine No. 1 (T.A.B.C.P.).

It is interesting to note that we have had much better results in rabbits inoculated in this country than in the Tropics. Very often, in Ceylon, rabbits which were inoculated with more than four species of germs produced antibodies only for three or four species and not for all. In Ceylon rabbits are generally smaller than in Europe, and big healthy rabbits in this country seem to respond to inoculation much better. The results as regards agglutinins in two rabbits are collected in Table 1.

TABLE 1.—*Pentavaccine (T.A.B.C.P.).*

Rabbits inoculated	Blood tested against	Limits of agglutination. Weeks after first inoculation					
		1	2	3	4	5	6
No. B—III	*B. typhosus*	1/160	1/1280	—	1/320	—	1/160
	B. paratyphosus A	1/20	1/320	—	1/80	—	1/40
	B. paratyphosus B	1/160	1/640	—	1/160	—	1/160
	V. choleræ	1/160	1/640	—	1/160	—	1/160
	B. pestis	1/20	1/160	—	1/80	—	1/20
No. A—4...	*B. typhosus*	1/160	1/1280	1/640	1/640	1/320	1/160
	B. paratyphosus A	1/20	1/160	1/80	1/40	1/20	1/20
	B. paratyphosus B	1/80	1/640	1/320	1/80	1/80	1/40
	V. choleræ	1/80	1/1280	1/320	1/80	1/80	1/80
	B. pestis	0	1/140	1/20	1/20	1/20	1/20

Porcelli observed that rabbits inoculated with the pentavaccine T.A.B.C.P., prepared by one of us, showed complete protection against the subcutaneous injection of virulent plague bacillus.

Blood Examination of Individuals inoculated with Pentavaccine No. 1.

Lack of time has prevented the study of the amount of all protective substances produced in inoculated individuals. The investigation, therefore, has been limited to studying the amount of agglutinins produced in comparison with individuals inoculated with simple "one disease" vaccines, the results being practically identical.

PENTAVACCINE No. 2 (T.A.B.C.M.).

This combined vaccine is prepared according to the technique already described. It is so standardized that each cubic centimetre contains:—

Typhoid	500 million
Paratyphoid A	250 ,,
Paratyphoid B	250 ,,
Cholera	2,000 ,,
Malta fever	2,000 ,,

In man ½ c.c. is given at the first injection, and the same or double the dose a week later.

Inoculation of Rabbits.—Three rabbits have been inoculated, with the results as regards agglutinins shown in Table II.

TABLE II. *Pentavaccine No. 2 (T.A.B.C.M.).*

Rabbits Inoculated	Blood tested against	Limits of agglutination. Weeks after first inoculation					
		1	2	3	4	5	6
No. B—1...	*B. typhosus* ...	1/160	1/1280	—	1/160	—	1/80
	B. paratyphosus A...	1/20	1/160	—	1/40	—	1/20
	B. paratyphosus B...	1/40	1/320	—	1/160	—	1/40
	V. choleræ ...	1/40	1/640	—	1/80	—	1/40
	M. melitensis	1/20	1/320	—	1/160	—	1/80
No. B—2...	*B. typhosus* ...	1/40	1/1280	—	1/160	—	1/40
	B. paratyphosus A ...	0	1/80	—	1/20		1/20
	B. paratyphosus B ...	0	1/160	—	1/40	—	1/20
	V. choleræ ...	0	1/640	—	1/320		1/40
	M. melitensis	1/20	1/320	—	1/80	—	1/40
No. A—19	*B. typhosus* ...	1/20	1/1280	1/1280	1/320	1/160	1/160
	B. paratyphosus A ...	0	1/640	1/640	1/160	1/80	1/80
	B. paratyphosus B ...	0	1/640	1/640	1/320	1/80	1/80
	V. choleræ ...	0	1/1280	1/640	1/320	1/160	1/80
	M. melitensis	0	1/320	1/640	1/320	1/80	1/40

Inoculation in Man.

In man 0·5 c.c. is given subcutaneously in the arm, and a week later another injection of the same or double the dose. The reaction, according to observations made by one of us in Ceylon, and by Lurie in Serbia, is not severe, and the inoculated individuals are able to resume their ordinary avocations in twenty-four to forty-eight hours. The inoculated persons develop agglutinins in large amount for typhoid, in fairly large amount for paratyphoid A and paratyphoid B, in small amount for cholera and Malta fever; the amount of agglutinins produced does not seem to be much smaller than in control individuals inoculated with monovaccines.[1]

HEXAVACCINE (T.A.B.C.P.M.).

This vaccine consists of an emulsion in carbolized salt solution (carbolic acid 0·5 per cent., salt solution 0·85 per cent.), of *B. typhosus*, *B paratyphosus* A, *B. paratyphosus* B, *V. choleræ*, *B. pestis*, and *M. melitensis*. The technique of preparation is the same as that for the other multiple vaccines described above. The combined vaccine is standardized so as to contain per cubic centimetre:—

B. typhosus	500 million
B. paratyphosus A	250 ,,
B. paratyphosus B	250 ,,
V. choleræ	2,000 ,,
B. pestis	500 ,,
M. melitensis	2,000 ,,

In man 0·5 c.c. is given the first time, and the same or double the amount a week later.

Inoculation of Rabbits.—Rabbits have been inoculated in Ceylon and in this country, the doses varying between 0·1 and 0·5 c.c. The rabbits in Ceylon did not respond very well to the inoculation as a rule; agglutinins in a number of cases did not develop for all the germs. In this country we have had much more satisfactory results. These are collected, as regards agglutinins, in Table III.

Porcelli, carrying out experiments in the South of Europe with a hexavaccine prepared by one of us, found that bacteriolysins were produced in very satisfactory amount for all the germs. He observed also that the inoculated rabbits showed complete protection to the subcutaneous injection of virulent *B. pestis*.

Inoculation of the Hexavaccine in Man.

Six persons were inoculated in the Tropics in 1913, and recently twenty persons in the Adriatic-

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[1] For details supporting this statement the reader is referred to Dr. Lurie's paper. "Observations on Castellani's Tetra vaccine and Pentavaccine," *British Medical Journal*, January 8, 1916, p. 45.

Balkanic zone. The reaction, as is the case with all vaccines containing plague, is severe; somewhat less severe, however, than after inoculating with Haffkine's plague monovaccine. The blood of two of the inoculated individuals was examined regularly during five weeks for agglutinins; they developed for typhoid in large amount; for paratyphoid A and paratyphoid B in a fairly satisfactory quantity; for cholera and Malta fever in small amount; and only a trace for plague. On the whole the production of agglutinins was similar to that observed in control individuals with monovaccines; but further researches on a much larger number of inoculated individuals will be necessary before coming to a definite general conclusion.

TABLE III.—*Hexavaccine (T.A.B.C.P.M.). Two Inoculations.*

Rabbits inoculated	Blood tested against	Limits of agglutination. Weeks after first inoculation					
		1	2	3	4	5	6
No. B—3	*B. typhosus*	1/320	1/1280	—	1/320	—	1/40
	B. paratyphosus A	1/40	1/160	—	1/40	—	1/20
	B. paratyphosus B	1/80	1/640	—	1/160	—	1/40
	V. choleræ	1/320	1/640	—	1/160	—	1/40
	B. pestis	1/20	1/80	—	1/20	—	1/20
	M. melitensis	1/160	1/320	—	1/160	—	1/40
No. A—21	*B. typhosus*	1/80	1/1280	1/1280	1/320	1/80	1/80
	B. paratyphosus A	0	1/320	1/160	1/80	1/20	1/20
	B. paratyphosus B	1/20	1/1280	1/640	1/160	1/80	1/80
	V. choleræ	1/20	1/640	1/320	1/320	1/80	1/80
	B. pestis	0	1/20	1/40	1/20	1/20	1/20
	M. melitensis	1/20	1/80	1/160	1/160	1/80	1/80

CONCLUSIONS.

(1) The inoculation of the combined vaccines mentioned in this paper is harmless. The reaction is not severe with the exception of those containing *B. pestis*, but even simple plague monovaccines, whatever their method of preparation, give a severe reaction.

(2) The mixed vaccines should be prepared by using emulsions in carbolized normal saline solution (carbolic acid 0·5 per cent., salt solution 0·85 per cent.) without heating. These emulsions give much less local reaction than broth cultures killed by heat. The presence of 0·5 per cent. carbolic acid is sufficient to kill the micro-organisms.

(3) It is essential to use in the preparation of the vaccines selected strains of the various micro-organisms which have been found by experience to be rich in antigen. This is especially the case as regards *B. paratyphoid* A and *M. melitensis*, some strains of which are very poor in antigen, and when injected give rise to only a small production of antibodies.

(4) Combined vaccines are of practical advantage, especially in the case of troops, rendering possible a contemporaneous immunization for several different maladies; this saves a great deal of time, and the men do not suffer the discomfort of a large number of inoculations. To protect the troops against typhoid, paratyphoid A, paratyphoid B, and cholera with the old method of ordinary monovaccines in succession, eight inoculations at least were necessary, spread over a period of two months; with the tetravaccine T.A.B.C. two inoculations only are sufficient, spread over a period of a week.

(5) The triple vaccine, typhoid + paratyphoid A + paratyphoid B (T.A.B.), prepared and used by one of us since 1905, has been adopted in practically all the armies. We consider that the tetravaccine (T.A.B.C.) is also past the experimental stage, and should be adopted in the routine inoculation of troops going east. The pentavaccines (T.A.B.C.P. and T.A.B.C.M.) have given encouraging results, and can in our opinion be used without any risk. The hexavaccine (T.A.B.C.P.M.) is still in the experimental stage, and we propose to continue our experiments on it, as we consider that this vaccine, if it be found efficient, would constitute the ideal vaccine for use in the Tropics.

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Reviews.

BLOOD PICTURES: AN INTRODUCTION TO CLINICAL HÆMATOLOGY. By Cecil Price-Jones, M.B. Pp. 91. Bristol: John Wright and Sons, Ltd. Price 6s. 6d. net.

This work is primarily intended, and will materially assist students and clinicians to interpret the results of reports on blood examinations for purposes of diagnosis as well as for prognosis, and contains also instructions for the making of blood counts and films. The examination of red and white cells, the detection of bacterial and protozoal infections, as well as blood diseases, including von Jaksch's anæmia, are described in detail. The work is to be recommended as thoroughly fulfilling the objects of the author, especially for laboratory use. The print is clean; the paper is not glossy. There is ample margin for notes.

DISEASES OF THE THROAT, NOSE, AND EAR. By W. G. Porter, M.B., and P. McBride, M.D. Second Edition. Pp. 280. Bristol: John Wright and Sons, Ltd. Price 7s. 6d. net.

The authorship presents a somewhat unusual combination. The first edition was prepared by an active practitioner and teacher; this, the second edition, was revised by a veteran author and teacher. It may be said that the book is a clear and eminently practical statement of all desirable knowledge on the subjects dealt with, and can be thoroughly recommended to those commencing the study of the subject, and those who desire to revive their knowledge. The pleasure of reading the book is considerably enhanced by the excellent illustrations and clear prints. They are most useful, well chosen, sufficient, but not too many. The perusal of the book is much assisted by the heading of every page indicating what the page treats of. The plates are excellent. Not the least practical feature of the work is the care devoted to details of treatment.

NOTES ON MILITARY ORTHOPÆDICS. By Colonel Robert Jones, C.B. Pp. 132. London: Cassell and Co., Ltd. Price 2s. 6d. net.

A great deal of work has recently been done on the subject which is discussed and explained by the author, who fully describes both operative as well as conservative treatment. The subject is one well worthy of careful consideration, particularly as the treatment of war deformities is long and tedious, not only to the soldier, but also to the surgeon, and the well-known experience of Colonel Robert Jones has been brought to bear with extreme benefit to produce speedy and satisfactory restoration of function, health, and earning power. The book is pleasantly written, with a good table of contents and index, and can be carefully studied to acquire a comprehensive knowledge of the subject, or referred to as emergencies occur.

HYGIENE AND PUBLIC HEALTH. By Sir Arthur Whitelegge, K.C.B., M.D., and Sir George Newman, M.D. Thirteenth Edition revised and enlarged. Pp. 796. London: Cassell and Co., Ltd. Price 10s. 6d. net.

Although tropical hygiene requires special knowledge, it also necessitates a thorough acquaintance with all varieties of hygiene at home. Before comprehending the effect of heat and moisture on the vitality of fleas as affecting plague, it is necessary to be acquainted with the ordinary details of air and meteorology. The authors in this now well-known text-book deal exhaustively with the whole subject of hygiene, devoting one chapter to tropical diseases. To show the necessity of a thorough knowledge of home hygiene, one has only to point out the subjects dealt with by the authors—water, food, and soil, drainage and removal of refuse, disposal of the dead, animal parasites, infection and immunity, infectious diseases and their prevention, and disinfection.

THE BIOLOGY OF TUMOURS. By C. Mansell Moullin, M.A., M.D., F.R.C.S. Pp. 55. London: H. K. Lewis and Co., Ltd. Price 2s. 6d. net.

This highly suggestive work, expanded from a lecture delivered in 1912, will interest all who take not only a practical but also a theoretical and speculative interest in the subject. The scope of the book is best understood from the author's statement that "the conclusions of the author differ in many particulars from the views that are current generally, and must therefore expect to meet with a good deal of adverse criticism. Time will tell. In science, at least, orthodoxy is only the doxy of the day."

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NEWS AND NOTES.

CHINA as a cotton-producing country is coming gradually to public notice. For some time a great deal of cotton has been grown in China, so much so that it is the third of the great cotton-producing countries. The United States of America stands first with an average crop of about thirteen million bales, India second with four million, and China third with some two million bales. It only requires organization by the Chinese authorities to increase the yield to enormous quantities, so much so that it is believed China could become the greatest of all cotton-growing countries. In time this may come about, but the Government of China is so behindhand in all questions of organization at present that this boon to China is not a matter of the immediate future. Yet they have the climate, the labour, and the money in China to bring it about at any moment if the authorities chose so to do.

Original Communications.

TWO UNUSUAL CASES OF FILARIASIS OBSERVED IN NORTH QUEENSLAND.

By A. Breinl and H. Priestley.

(From the Australian Institute of Tropical Medicine.)

Filariasis, a disease fairly widely distributed throughout North Queensland, shows clinically the same variety of symptoms as recorded from other parts of the Tropics. The clinical manifestations of two cases recently observed proved of particular interest, as they differed from any hitherto observed here.

The first case, a girl, aged 26, stated that she had noticed during the last four years a swelling in her right groin, which decreased in size during a night's rest, but became more marked after a day's exertion. She had noticed for some time a few water blisters, of the size of a small lentil, in the skin of the left side of the lower abdomen. These small blisters were easily ruptured by slight rubbing, even with a towel, and they then discharged a large quantity of pinkish milky fluid. The oozing continued for hours, or even days, necessitating a frequent change of dressings.

An examination showed a doughy swelling in the right groin, extending about 5 cm. above Poupart's ligament and involving Scarpa's triangle. In the skin of the left iliac fossa, about midway between the anterior superior iliac spine and the pubes, there were six vesicles, from 1 to 3 mm. in diameter, of ground glass appearance, and pinkish colour. On pricking one of the blisters with a needle pinkish chylous fluid oozed out, which was found on microscopical examination to contain a small number of red blood corpuscles, but on no occasion filarial larvæ. Examination of the peripheral blood performed during the day proved negative, but at night filarial larvæ, corresponding to *Microfilaria bancrofti*, were found in numbers.

The discomfort to the patient caused by the periodical rupture of these vesicles, and the consequent leakage of chylous fluid, justified an attempt to extirpate the affected skin and subcutaneous tissue. Under general anæsthetics an oval area of skin, about 6 by 4 cm., containing the vesicles with the underlying subcutaneous tissue down to the fascia over the external oblique muscle was removed. The adipose tissue of the area of operation contained a rich branching meshwork of large lymphatic vessels and a few seconds after the incision the wound was filled with chylous fluid. In order to set up drainage between the superficial and deep lymphatics, a cross-shaped incision was made in the fascia and the corners stitched back, leaving the muscle uncovered over an area of about 3 cm. The wound edges were carefully approximated with deep salmon-gut sutures and the skin with horsehair.

The recovery was uneventful. There was no leakage of chyle after the operation, and the stitches were removed after seven days, when primary union had taken place.

Of the blisters and underlying tissue serial sections were cut and examined microscopically. It was found that there was, throughout the subcutaneous tissue, a rich network of hypertrophic lymph vessels, forming here and there dilatation and diverticula filled with coagulated lymph, mixed with a few red blood corpuscles. The connective tissue surrounding these lymph vessels showed a considerable amount of small-celled infiltration. It was observed that the vesicles which communicated with the dilated lymph vessels were intracutaneous, and were covered by a layer of epidermis only; in some the epidermal covering over the centre of the vesicle was thinned, and only represented by a sparse layer of keratin. The microscopical appearance made it easily understood how the least injury caused the vesicle to rupture, with consequent copious leakage of lymph.

Another case showing an unusual clinical picture due to filariasis came under observation. The patient, a very well-nourished man of about 47 years of age, was admitted to the hospital with a diagnosis of "acute abdomen." He was conscious, and complained of severe pains in his abdomen. He was obviously very ill, his face was drawn, his tongue dry, his abdomen distended, rigid and tender on palpation. The groin glands of the right side were palpable, and the groin, the seat of an extensive doughy swelling, extending about 10 cm. above Poupart's ligament and over the whole of Scarpa's triangle. The pulse was soft, fluttering, about 160 beats to the minute, the temperature was subnormal, and the extremities cold and clammy.

For nearly eleven years he had noticed a soft swelling in the right groin, which, however, had not given rise to any serious discomfort, so that he had been able to follow his usual occupation until the previous morning, when he suddenly felt pain in his abdomen, which was not relieved by aperients and hot fomentations. A clinical diagnosis was made of acute peritonitis, probably after perforation of some abdominal viscus or acute hæmorrhagic pancreatitis; operation was considered, but the condition of the patient contra-indicated any surgical interference. The patient became gradually worse, and died ten hours after admission.

The examination of the peripheral blood after admission revealed one filarial larva in four drops of blood.

A post-mortem examination was performed three hours after death. The body was that of a well-nourished man with abundant adipose tissue. The right groin and Scarpa's triangle were the seat of an extensive soft swelling. Rigor mortis was marked, but there was no post-mortem discoloration. The pleural cavity did not contain any excess of fluid, heart and lungs were macroscopically normal.

The abdominal cavity contained about one pint of pinkish chylous fluid containing numerous small flakes of fibrin. The peritoneum was smooth, shiny, and not congested. The intestines were distended, but otherwise normal. Below the anterior border of the liver there extended an irregular ill-defined flesh-coloured mass of soft tissue consisting of numerous cysts, varying in size from 3 mm. to 4 cm. in diameter, embedded in œdematous connective tissue. This mass extended below the liver and was connected with a similar mass, extending retroperitoneally over the posterior abdominal wall, and consisting of hypertrophic and hyperplastic lymph vessels, forming here and there cysts up to 8 cm. in diameter. The majority of these cysts had smooth walls, and contained chylous fluid similar in appearance to the fluid free in the abdominal cavity, a few were filled with a dark brownish viscid fluid. It was thus seen that the whole of the lymphatic system of the retroperitoneal space had become involved by a hypertrophy and hyperplasia, which extended below Poupart's ligament on the right side, implicating the lymphatics of Scarpa's triangle. This mass, consisting partly of distended and cystic degenerated lymphatics and œdematous connective tissue, was up to 10 cm. in thickness, and concealed the kidneys and pancreas.

The organs of the abdomen were macroscopically of normal appearance. The mesenteric lymph glands were slightly enlarged, the retroperitoneal lymph glands distinctly enlarged, soft, and œdematous on cross sections. The right testis was slightly increased in size, but the lymph vessels of the cord were normal. In spite of careful search no adult filaria was discovered, nor the site of the ruptured wall of the lymphatic varix.

The post-mortem findings made it probable that the clinical symptoms—acute peritoneal irritation and collapse—were due to the rupture of a lymphatic varix and the effusion of chylous fluid into the peritoneal cavity, as no other pathological cause could be detected.

The tissue was examined microscopically. Sections showed that the above described mass consisted of a network of greatly dilated lymph vessels embedded in loose œdematous connective tissue, the seat of a marked small-celled infiltration. The walls of the larger lymph vessels showed a high degree of hypertrophy. Here and there were well-defined roundish or oval collections of lymphoid cells, surrounded by tissue closely resembling in structure that of the walls of hypertrophied lymph vessels. Amongst these lymph cells were fibroblasts, and large cells with nuclei, poor in chromatin, with irregular cytoplasm, apparently of endothelioid character, and numerous newly formed capillaries. Now and again these collections of cells consisted of two distinct layers, a central one formed of lymphocytes, and a peripheral one consisting of the larger type of cells. It is apparent that these collections corresponded to cross sections of occluded lymphatics.

The liver showed cloudy swelling of its parenchyma. The spleen microscopically showed congestion and hypertrophy of the trabecular connective tissue. None of the other organs showed marked histological changes.

We have not been able to find in the literature at our disposal record of a similar case, where a ruptured lymph varix had given rise to symptoms of acute peritonitis and death.

NOTE ON THE VALUE OF SALVARSAN IN RELAPSING FEVER AND MALARIA.

By W. L. Peacock, Captain, U.M.S.
Medical Officer, Mwanza.

In the circular accompanying the original packages of salvarsan, claim is laid to the curative effect of that drug in cases of relapsing fever and of malaria. This statement is repeated in most of the text-books on tropical medicine to which I have had access.

I regret to say that, in practice, the results claimed are not in accordance with the effect obtained.

During the latter part of 1916 a large number of Indians among the 98th Infantry, stationed at Mwanza, German East Africa, suffered from relapsing fever—a severe type of which is very prevalent here.

In conjunction with Lieutenant Roche, I.M.S., I gave salvarsan intravenously to some twelve cases. These were given in all stages of the disease. Some in the apyretic period and others on the second or third day of the fever. In every case Lieutenant Roche was able to demonstrate the presence of the parasite in from six to fifteen days later. Similar results were obtained with African patients.

In the case of one of my personal boys, Ali, 0·5 grm. was administered on the second day of the initial attack. The reaction was extremely pronounced. Severe headache and profuse sweating followed an hour after the injection and acute pain was complained of in the region of the spleen, the latter swelling up to about six times its normal size during the next three days. Parasites could not be demonstrated in the blood, but an erratic fever followed which persisted for three weeks, after which the pain and swelling disappeared, leaving the patient much prostrated.

The drug was given in all cases intravenously and in doses varying from 0·1 to 0·5 grm.

As regards the effect in malaria, two cases have come under my personal observation.

In the first case, a Hindu Assistant Surgeon, accidentally infected with syphilis in the finger, was given a full dose of salvarsan (0·6 grm.). The usual reaction followed about an hour later, but fever persisting on the second day, a blood examination was made and malarial parasites in the form of young rings were found.

In the second case, a European suffering from early secondary syphilis was given his second dose of 0·5 grm. salvarsan ten weeks after the first.

The reaction was mild, but thirty-six hours later severe headache, blood-stained vomiting, and joint pain ensued.

A blood examination showed numerous malarial parasites apparently of about twenty-four hours' growth. Symptoms rapidly disappeared with an injection of quinine.

In both of these cases the parasite was of the subtertian variety. I have had no opportunity of observing the effect in cases of benign or quartan fever. The following conclusions are, I think, legitimate:—

(1) Salvarsan is useless in relapsing fever, at any rate in single doses. Possibly if given on the first day of the fever some result might be obtained, but the severity of the reaction renders great caution imperative, and it is doubtful whether it would not be preferable to endure the fever.

(2) In malignant malaria, if anything, salvarsan has a stimulating effect, certainly it is no cure.

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Injections of Boiling Water in Exophthalmic Goitre.—E. M. Olivieri and P. Ronchi (*Prensa Medica Argentina*, July 10) injected 10 c.c. of boiling water alternately into each one of the lobes of the thyroid at different points each week. The simplicity of this method of treatment commends it, as all that is necessary is the needle, syringe and rubber gloves to protect the hand. There is no danger from it, and merely a sensation of burning, most marked in the skin. There is sometimes an inflammatory reaction, but this soon subsides spontaneously or under cooling compresses. The improvement that followed was marked, the nervousness subsiding, as also the tachycardia, exophthalmos and goitre in notable degree; the menstruation became regular, and the patients gained from 4 to 13 lb. in weight. They advise a trial of this treatment before operating when medical measures have failed. It will at least aid in getting the patient into better condition to stand an operation later, if deemed necessary.

Solidified Alcohol.—T. Nogier describes (*Presse Médicale*, July 23) the many advantages of the alcohol soap which is proving so useful in the trenches as fuel. It lights when touched with a match, and it combines the action of both alcohol and soap in cleansing hands and the field of operation. It is prepared by adding 150 grm. of dry and finely scraped Castile soap to 500 c.c. methylated spirit and adding 12 grm. of flake shellac and shaking well, then heating in a water bath, and pouring the clear fluid into moulds to harden.

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THE JOURNAL OF

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NOVEMBER 15, 1917.

THE COLONIAL MEDICAL SERVICE.

The report from almost every Crown Colony is that there is a scarcity of medical men owing to doctors joining for war service, and that there are no young men available to fill the vacancies. This trouble will continue and become more acute during the next five or more years, for the deficiency cannot be made up quickly. The source from which our supply of medical men springs is almost dried up, as even the younger medical students at the schools and universities are enlisted and sent into the ranks. Of all branches of the public service the Colonial Medical Service is likely to prove the most seriously affected by the War. When normal times return the deficiency of men at home will claim the first qualified men almost exclusively, then the Navy and Army, and lastly, the Colonial Service. We have on previous occasions drawn attention to the reasons why the Colonial Medical Service is not rendered so attractive as it might be. In using even the term Colonial Medical Service, we are told that there is no such thing as a "Colonial Medical Service"; that there is a West African, a Malay States, a Barbados, a Hong Kong, &c., Medical Service, but no such thing as a Colonial Medical Service in the sense of the Naval Medical Service, Army Medical Service, or even Poor Law Medical Service. It is pointed out that such a service is impossible, owing to the dissimilarity of the component parts, out of which such a service could be evolved, as in scarcely any two colonies do the same conditions obtain. In one the medical officer gives whole-time service, in another part-time; in one private practice is allowed, in another forbidden. Rates of pay vary, whilst some are on a silver basis, some on a gold. The amount of pension granted, and the age at which a pension is attainable, have no general fixity. Local laws may alter pay, duty, and pension at the will or whim of a committee. Questions of leave, whether ordinary or sick leave, are a continual cause of trouble and friction. These are some of the detriments to organization of the service, which for convenience we will continue to call the Colonial Medical Service. There are others which are inevitable; as when the majority of the council, committee, or governing body which direct the hospital affairs are of different nationalities or of different races, there are, and there will always be, the latent elements of explosions present which will almost certainly break out into open friction; although these are for several reasons less frequent than one might expect. From these standpoints we have to consider the position of the medical man who joins the local service in a Crown Colony or Protectorate. His duties are assigned him on arrival, and as the years pass he fits into the place, and continues in his billet until he finds himself "an old hand" in the service. He sees many things that want alteration—his own status, payment, pension, &c., and he gradually comes to grasp the fact that his days are being passed in a groove with but few channels of advancement or of bettering his finances. He dare not move in the matter, for if he has been a number of years in the service he risks losing his place and pension, with possibly a family. It may be said it is the same in all public services, and the Colonial Medical Service offers no exception. This, however, is not the case. A medical officer in the Army or Navy has a goal before him, such as increased rank, betterment of position, and increase in pay according to rank. He has something to work towards, and the attainment of a high position if he has talent. There is little of that in the Colonial Medical Service; the grading carries with it but meagre attraction, distinguished service counts but little, and the ultimate goal of long and faithful service is not of such a character as to generate endeavour beyond the due fulfilment of routine duty.

This should not be; a young man in an out-of-the-way island in the Pacific performs work which is "unseen and to the Lord"; but the routine and isolation is calculated to crush the spirit, and does not generate that emulation which should be his always, if life is to be anything but the mere drudgery of routine. How is the matter to be dealt with?

In an article by Surgeon-General Evatt, C.B., which appeared in the *British Medical Journal* in 1896, and by the writer in 1898 in a speech at the Imperial Institute when he called the meeting, at which he proposed a school of tropical medicine, the question of the organization of the Colonial Medical Service was dealt with. In these communications reorganization of the service, or rather, the creation of a service is advocated, for at that time it was a "ramshackle" confederacy of systems without a soul and with but little body; of loose links which form no chains, and of steps which do not form ladders leading to higher levels. Is it beyond the power of Britons to deal with this problem? Some declare it to be so, for the items of engagement, of payment, of pensions and of work expected and accomplished are so diverse that it seemingly defies the powers of man to solve. An attempt, and a successful attempt, has been made in West Africa, and we have a real West African Medical Service, or at any rate a step in the right direction of organization out of which a real service may emerge and develop; it, however, still lacks true gradation, with a designation or title of rank showing position in the service, with corresponding pay attached to that title or rank. If in West Africa, why not in the West Indies? and if there, why not in the East Indies, and so in all Crown Colonies and Protectorates? We hope to live to see a great Colonial Medical Service, just as we have a great Army Medical Service, with its Director-General and Colonial Medical Staff, as in the case of other public services. The medical officers of the R.A.M.C. are told off for duty with regiments, are sent to different colonies where payment varies with the rate of exchange, and where duties are modified according to environment. Cannot the Colonial Service be thus regulated? The Governor of each Colony or Protectorate should send in to the central office in London what the medical needs of his colony are and the moneys he can raise to supply these needs. The central office would then send one or more medical officer from some neighbouring colony, or it may be from home, or make provision that these needs are met by employing medical men who happen to be on the spot, as is the case now. In the Indian Medical Service the I.M.S. members are told off for military duties or for civil practice; be they lecturers in the medical school, superintendents of botanical gardens, medical officers to gaols, to districts, or to one of the many branches of work which civil practice entails. These men still belong to the service, they rise in military rank—that is, from captain to major, to colonels, and to surgeon-generals—although they have not attended a soldier for years, nor even worn a uniform except on State occasions. The Colonial medical officers can be equally well organized and graded, and it only wants the touch of the super-organizer to bring it about. This looks all simple enough; yet the difficulties and prejudices to be overcome are many; yet the writer contends they are not insoluble, especially with the experienced and capable medical advisers at present with the Colonial Office.

The governor of a colony is but there for a time—a short time really; the staff under him are for the most part permanent; they have got into the routine of system, and the plan in vogue in connection with the medical department suffices to get the men to do the work satisfactorily; therefore, why change? So said the supporters of the old plan of supplying the Army with doctors. The regimental doctor was attached it may be for life to that regiment, of which in course of time he became the "father," the mess president, &c., and he performed his social duties admirably. But he was a mere social attendant, not a medical officer of a great department with its ambitions, its encouragements, its rewards, and its chances of distinction in the field of sanitation or organization. He lacked both the power and training to deal with the sick and wounded on the field.

When the spirit of a goal to be reached is infused into the Colonial Medical Service we will be doing but bare justice to a most excellent body of medical men, many of whom have added to our knowledge of tropical diseases, who have made many original discoveries, and whose names are high up in the roll of honour in science. But we hope to see the whole service unified, organized, graded, suitably rewarded, removed from the position of being under the control and payment of scattered local committees and councils, and elevated to a service of which its members may be proud, and find it an honour, to belong to. The medical officers now advising the Colonial Office are quite capable of dealing with this problem, and it only requires the touch of an organizer in high quarters to vivify the procedure and lead to full development and completion, so as to bring this great public service to a status equivalent to the other great Imperial Medical Service of the Crown.

J. C.

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Abstract.

SKIN DISEASES WITH OCULAR MANIFESTATIONS.[1]

By W. B. Weidler.

Keratitis ex Acne Rosacea.

In acne rosacea the sebaceous glands play the same part that the meibomian glands do in the chalazion formation.

Keratitis ex acne rosacea is due to the direct extension of the acne first to the conjunctiva, thence to the cornea. There is usually seen small granular elevations on the conjunctiva, with engorgement of the vessels, the cornea becomes slightly hazy, with infiltrations into the epithelial layer, and ulceration of the cornea. In more severe cases we may have perforation of the cornea with prolapse of the iris and the formation of leucoma adherans.

There are, as far as I can find, only about eighteen cases of keratitis ex acne rosacea reported in the literature.

The corneal infiltrates have been regarded by some observers as sub-epithelial in character, but begin in the epithelial layer of the conjunctiva and the cornea, and later involve the deeper layers of the cornea.

Various processes take place in the diseased skin in acne rosacea, which may give rise to the formation of nodes, pustules, and a thickening of the skin that may form the source of large outgrowths.

Case.—Aged 42, family history negative. General health usually good. Has had three miscarriages. One son has trachoma. About twenty years ago, after the birth of her child, she began to have an eruption on the nose and face which was diagnosed and treated as acne rosacea. Eight years later the acne began to involve the left eye. She was treated at this time with good results and was referred later to the skin clinic. Seven years ago she had a return of the eye trouble, and since then has had frequent attacks of keratitis. The skin eruption was most marked. The edges of the lids were swollen and red, with intense photophobia and lacrimation.

Right Eye.—Pronounced injection of bulbar and tarsal conjunctiva. The vessels in the bulbar conjunctiva were dilated and tortuous, and extending on the cornea for about about 6 or 8 mm., some of the vessels reaching the upper edge of the keratitis and then turning on themselves in small loops. Some of these return loops reached almost to the corneal scleral margin again. These vessels and their looping may be plainly seen at the present time. The portion of the cornea involved by the process gave a reddish-grey reflex. A small chalazion was present at this time in the lower lid of the right eye, which was opened and curetted.

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[1] Abstracted from the *New York State Journal of Medicine*, October, 1917.

Left Eye.—The keratitis was much more severe and the destruction of the corneal tissue greater. This was the eye in which the keratitis had begun twelve years previously. The vessels were much larger and more numerous. The lower half of the cornea was rough and granular in appearance. The pupillary portion of the cornea was being encroached upon. The pathological changes seemed to extend into the deeper portion of the cornea.

After a month of treatment the patient ceased to report at the clinic. The face and eyes had cleared very nicely. The cornea of each eye was clean and the vessels were much smaller. After an absence of nearly two months the face and eyes were about as they were when first seen; the left eye a trifle worse. Near the centre of the cornea was a round, smooth, bulging area which looked as if it might perforate. Faint traces of staining about the edge were seen after fluorescin had been instilled into the eye.

The corneal ulceration perforated with a gush of aqueous, and when the patient reported to the clinic the perforation had closed. During the period of two years or more that she was under observation and treatment there had been three perforations of the cornea.

Treatment.—The treatment consisted in the use of large, increasing doses of sodium salicylate, Epsom salts, before breakfast; tonics and regulation of diet. Patient used "lotio alba" on the face once or twice a day, and it seemed to control the acne, and whenever she was faithful with the application of this the eyes were always better. Boric acid wash, hot compresses, atropine, and dionine were used in the eye, and this was supplemented with bandage whenever perforation was imminent or had taken place.

When the cornea had become so thinned and weakened by the perforations and there was a complete pannus, a *peridectomy* was performed. The eye was cocainized, and a fold of the conjunctiva about 4 mm. from the edge of the cornea was grasped by a fixation forceps and divided by scissors. The cornea was circumscribed, the same as is done for enucleation, and a flap of conjunctiva was excised about 3 mm. wide, which carried us to the corneal margin.

There was considerable reaction, but the eye cleared up in about a week, and the area which was denuded of conjunctiva was bridged across with what appeared to be a new connective tissue formation.

There has not been any recurrence of the keratitis, and the eye has been perfectly white and quiet for the past ten months.

This operation was first suggested for pannus associated with trachoma.

Peritomy may be done thus: "The conjunctiva is incised at the limbus by means of scissors for a considerable distance beyond the limits of the corneal lesions. The conjunctival flap is then undermined 4 to 5 mm. beyond the limbus, and then the flap is brought up to the corneal margins by means of two sutures, one at each end of the incision."

Overloading with protein food causes putrefaction in the intestines with auto-intoxication by absorption.

The following prescriptions have been of real help to me in managing some of these cases:—

℞. Potass. acetas ... ... ʒii.
Tr. nucis vomicis ... ... ℥iii.
Fl. ext. rumic. ... ... ad ℥iv.
Sig. ʒi., in aq. ½ hour before meals.

℞. Mist. rhei et sodæ ... ... ℥iii.
Sig. ʒi., in aq. immediately after meals.

℞. Ung. hyd. ammon. ... ... ʒv.
Ung. zinci ox. ... ... ʒiv.
Ung. aq. rosæ ... ... ad ℥ii.
Sig., apply twice a day.

BLEPHAROCHALASIS.

This is a dystrophy of the skin and subcutaneous connective tissues of the eyelids, later followed by atrophy.

It appears to begin with an œdema of the subcutaneous connective tissues of the upper lids between the skin and the tarsal plate. There is, in consequence, a marked stretching and apparent thinning of the skin of the lids. The veins become very much more prominent, and the swelling is entirely limited to the upper lids. Later there is a gradual disappearance of the swelling with a marked relaxation and drooping of the skin of the lids. This continued until there was complete disappearance of all of the swelling and the skin of the lids hanging down in bag-like pouches covering the cornea.

Microscopic studies of the tissues removed from the lids, so far, have been negative.

REPORTS.

Case 1.—Miss F. V., aged 16, family and personal history negative. Trouble began at 14 years of age, when she first noticed swelling, it would come and go, and later became permanent. There was a drooping of the subcellular tissues down to the palpebral margins of the lids. The skin was smooth, pinkish in colour, and veins slightly prominent.

Internal treatment by tonics, the use of seton through the swelling, and the electric current did not seem to have any effect upon the condition.

Now the skin in both the upper lids hangs down below the margin of the lids, covering about one-half of the cornea.

Case 2.—Miss M. H., aged 14, family and personal history negative. Trouble began about two and a half years ago, following a severe sunburn of the face and arms.

A slight swelling of the lids was noticed a few days after the blush of the sunburn disappeared. It has gradually increased. The skin of the upper lids was pinkish-red, hangs down in a smooth, pouchlike mass, partially covering the eyes. The swelling has the appearance of a true œdema of the subcellular tissues. Superficial veins in the lids more prominent and perhaps slightly engorged.

ECZEMA.

Eczema may extend to the lids from other parts of the face; or it may affect the lids by direct extension from a conjunctivitis, but should not be regarded as a true eczema, but rather an eczematous condition of the lids. It may begin in the lids and be limited entirely to this part of the face; this, however, is a rare manifestion of the disease.

There are the two types of eczema, the acute and chronic. The acute form is easy to diagnose and treat, but the chronic eczema affecting the lids often escapes the ophthalmologist and goes untreated for a long time.

The simultaneous occurrence of eczema of the skin and the eye suggests a common diathetic origin, while it may be explained in others as having been transferred directly from the skin to the eye, or from the eye to the skin.

Chronic eczema is most often seen in the adult, more often in women than men; and preferring the brunette type, more or less limited to the upper lids.

The lids are thickened, having a brownish, brawny appearance. The lids feel dense and heavy, with a roughness and harshness of the skin surface to the touch due to the exfoliation of the epidermal layer. There is a great deal of itching, burning, and feeling of heat in the lids at times. There may be, at times, a true hypertrophy of the cellular and subcellular tissues of the lids in the chronic eczema.

LEPROSY.

This occurs in two forms, the maculo-anæsthetic and the nodular, and both types may involve the eyelids, but the latter is the more frequent variety.

The nodular form of leprosy commences with an infiltration of the eyebrows, and if the conjunctiva is affected it is by direct extension from the lid margins. There may be true papillary enlargements of the conjunctiva and on the limbus; one may see at times granulation areas that will show the presence of the leprous bacilli on microscopic examination.

When the cornea is involved there is either a superficial punctate or deep parenchymatous keratitis or the formation of small lepromata. The deep parenchymatous keratitis is usually associated with inflammation of the iris and ciliary body, and leaves permanent scarring of the cornea.

Leprosy of the iris has somewhat the same appearance as tuberculosis of this tissue. The iris is very much thickened with nodes that may be single or confluent, usually without any of the active signs of inflammation.

Report of a Case.—Male, aged 32, English. Has been living in China for past ten years. About five years ago noticed a scaly eruption on hands and face, and has been under treatment intermittently for this condition, but seems to have got progressively worse. The eyes began to give trouble about one year after the skin affection began. When seen first there was a number of small elevated areas on the bulbar conjunctiva, more numerous about the corneo-scleral margin. There was a well-marked attack of iritis with the external ocular signs. Since the first attack of iritis he has had more or less trouble with his eyes, but has been able to do his work. Patient was on his way home from China to London when the eye symptoms became severe.

The skin lesions showed a scaly dryness and there seemed to be a thickening of the external dermal layer, which was of a grayish, mouse colour. There were several small, dense, subdermal, tumour-like swellings on the eyebrows and ears.

The conjunctiva was slightly reddened, the cornea of both eyes showed a well-pronounced, deep keratitis, with a great many old nebulæ. The iris showed that there had been previous attacks of iritis, which must have been quite severe. There were a number of synechial attachments, and the pupil dilated very slightly and irregularly, giving the moth-eaten appearance often seen after iritis. There were a number of elevated nodes in the iris, and some of these "tubercles" appeared to be new foci of inflammation, but others appeared to be old.

There was considerable pain, photophobia, and lacrimation.

Treatment.—The general treatment consisted of rest in bed, calomel, tonics, bowels were kept freely active. (Chaulmoogra oil was given in increasing doses, which he did not seem to tolerate very kindly.) For the local symptoms, atropine, dionine, warm boric acid, hot compresses, and leeches were employed.

LUPUS ERYTHEMATOSUS.

Lupus erythematosus, Crocker says, is only half as common as lupus vulgaris, whereas lupus erythematosus is far more common than lupus vulgaris in America. It is most commonly seen on the head and face, more especially the nose, cheeks, the lobes of the ears and the orbits. Occasionally it may be seen affecting the vermilion of the lips, in the mouth, and on the conjunctiva, usually by direct extension from the skin of the lower eyelid.

Lupus erythematosus affects the mucous membranes. This form of lupus erythematosus is the result of a general disease.

In the early stage it usually appears isolated or grouped in small, round spots, about $\frac{1}{4}$ in. in diameter, with a yellowish spot in the centre and a small, closely-adherent scale. These patches are of a dirty yellowish-white colour, and the duration of the disease is generally a matter of many months, and even years. Lupus erythematosus is followed by thin white scarring of the parts affected, and recurrence may take place in the scar.

The results from the use of carbonic acid snow have been fairly good, and before its introduction all forms of treatment, such as X-ray, Finsen light, and caustic had been used with varying and indifferent results.

Case.—Female, aged 30, Russian Jewess, had some slight redness of the edges of the lower lids, which was more or less confined to the middle and inner portion, and not so much at the margin of the lids as on the skin surface adjoining the margin. There was some slight scaling, and underneath the scaling the skin had a curious pinkish-white colour. I have never before seen a form of blepharitis just like the condition seen in this patient. She was given an eyewash of zinc sulphate 1 gr. to 2 oz. of aqua destillata, and yellow oxide of mercury was used night and morning.

After a month or more of treatment the condition did not show any great improvement or change. Various forms of treatment were continued for several months, using yellow oxide ointment and the red oxide of mercury, ichthyol, argyrol and Lassar's paste at different times without any distinct change in the lids, except the disappearance of the tendency to scabbing and scaling. A microscopic study of the secretion of the conjunctiva revealed nothing but a simple diplococcus. The treatment was interrupted for two months, and on her return there was again some slight scaling and redness of the lids, the same as was present on her first visit to the clinic. This had extended to the inner canthus and to the skin surface immediately adjoining.

Dr. George Crary, Dermatologist to the Manhattan Eye and Ear Hospital, saw her with me and pronounced it to be a case of lupus erythematosus. Treatment was continued for some months and the active signs all disappeared. The patient was seen six months later, and there was no recurrence of the active signs of the disease.

SOLID ŒDEMA OF THE FACE AND EYELIDS.

Recurrent and later persistent œdematous swelling involving the whole or limited portions of the face, such as the eyelids, the nose, or of the lips, usually the upper, has been described by Fox in Allbutt and Rolleston's "System of Medicine." It has long been known and described as recurrent erysipelas or lymphatic œdema.

It is characterized by recurring attacks at short, long, or irregular intervals in which the skin swells, sometimes with reddening and other signs of inflammation, but very often these signs of inflammation are absent. The part attacked becomes œdematous and swollen, but does not pit on pressure.

In many cases there is not febrile or constitutional disturbances, but only some local discomfort.

There are usually frequent attacks, the first one being often the most severe. When I first saw the case the condition had existed over a period of about seven years, during which time the œdema would entirely disappear for months.

The etiology has not been settled, but the general impression is that the condition is due to strepto- or staphylococcic infection, and that it resembles the recurrent attacks seen in other parts of the body, as the legs, where it induces a form of elephantiasis.

In many cases the nose has been found to be the site of a dermatitis, and a minute search should always be made in the nose, eyes, mouth and gums for any possible source or foci of infection.

Case.—Russian Jewess, aged 15. Present trouble began about six or seven years before without any apparent cause or injury. Patient noticed a slight swelling of the nose with some redness. The swelling gradually increased, extending to the upper lip, cheeks, and eyelids of both eyes. There was never any great amount of pain, but some tenderness when swollen parts of the face were pressed upon, especially the nose. The condition had existed all this time with little or no change, except at short intervals when the swelling was less. The nose was swollen to about twice its normal size, and there was some redness, and about the nostrils there was a well-marked eczematous condition. The nares almost completely blocked with crusts and scabs. The upper lip was very much swollen and enlarged. The cheeks showed the same type of swelling and both eyelids were swollen and dense, with considerable eczema of the edges. There was present a most violent photophobia and lacrimation. The nose was most sensitive to touch, and all of the swollen portions of the face gave a tense and solid feeling to the fingers on palpation, but did not pit.

The report from the rhinologist did not assist the diagnosis. A culture from the nose showed a very abundant growth of the *Staphylococcus pyogenes aureus*, and it was upon this factor, together with the chronicity and recurrences of the condition, the absence of the fever, and the resistance of all treatment, that led to diagnosis of a case of solid œdema of the face.

Treatment.—Fowler's Solution Tonic was given in increasing doses, attention to the bowels and diet with the local use of boric acid and argyrol. Nasal douching twice daily was ordered. There was no improvement in the condition until we started the injection of an autogenous vaccine of *S. pyogenes aureus*, and after two injections there was much less photophobia and lacrimation, and the swelling of the lids, nose, and upper lip was diminished.

This treatment was continued for two months with gradual disappearance of all swelling from the face and the relief of all the signs of inflammation in the nose.

She has been free from any recurrence of the trouble.

PEMPHIGUS.

Pemphigus of the conjunctiva is one of the grave diseases of the eye, and was recognized and diagnosed as such as early as 1858. When this condition affects the eyes it is usually bilateral, although often unequal in the degree of severity.

There does not seem to be any constant relation between the duration of the skin affection and the development of the eye lesions. Pemphigus may affect the conjunctiva primarily, but this is rare, and in some of the cases so reported the lesions of the skin or mucous membranes may have been overlooked. The diagnostic lesions may be limited to the mucous membranes of the nares and pharynx. Involvement of the mucous surfaces is a very unfavourable manifestation of this disease. Those cases of pemphigus in which the malady begins in the mouth the prognosis is very grave.

The course of the disease is usually very slow, extending over a period of years.

In regard to the etiology of the disease, sex and heredity seem to be of little importance.

Just what this disease is due to we are not as yet certain, whether it is due to some disturbance of the vaso-motor centres, or it may be a trophoneurosis. The latest theory that has been advanced is that certain forms of toxins affect the terminal nerve endings.

The various manifestations of pemphigus affecting the conjunctiva may be classified in the following manner:—

(1) Those cases with blebs or bullæ of the skin and conjunctiva.

(2) Those cases with blebs or bullæ of the mucous membranes and conjunctiva.

(3) Those cases where the blebs or bullæ may be limited, at first to the conjunctiva.

(4) Those cases described as "essential shrinkage of the conjunctiva."

There may be an essential shrinkage of the conjunctiva which may not be preceded by hypertrophy of this issue. Pemphigus and essential shrinkage were one and the same disease.

Case 1.—Russian, aged 70, never had any trouble with his eyes until six months ago, and at that time he was able to read the newspaper with glasses.

Examination.—Right eye: Vision, patient counted fingers at 3 ft. The iris was brown and reacted very sluggishly to light; tension normal. The edges of the lids were covered with a dried secretion, yellowish in colour, which matted the lids together. The lids were thick and shrunken. There was total symblepharon (the lids united to the eyeball, to their edges). The opening between the lids was about 8 mm. The bulbar conjunctiva was thick and thrown in folds over the cornea. A small portion of the cornea was visible. The eye presented somewhat the appearance of an old trachoma, with atrophy of the conjunctiva.

Left Eye: Vision, 20/200. The pupil was 3 mm. in diameter; the iris was brown and reacted to light accommodation and convergence; tension was normal. There was the same matting of the edges of the lids. The symblepharon was very slight and deeply placed in the cul-de-sac. At the limbus of the cornea there were several small whitish areas which, when gently rubbed with an applicator, bled freely. The conjunctiva was red and swollen, with the appearance of œdema at places. The corneoscleral margin showed a number of small, bleblike formations of a pearly-white colour. The rest of the cornea was clear.

The shrinking grew steadily worse in the right eye until it was impossible to separate the lids. The shape of the eyeball seemed to be preserved as far as could be determined by palpation. There was a curious swelling in the upper lid, directly under the skin, which may have been an enlargement of the lacrimal gland. There was also œdema of the upper lid, which lasted for about two weeks. The bulbar conjunctiva presented spots of necrosis in the left eye, which were white and bled very easily on the slightest attempt to make any examination of the eye. After bleeding there was immediate ulceration and formation of synechia between the conjunctiva of the eye and the lids. The bulbar conjunctiva was slowly extending over the cornea. The small areas of necrosis with the ulceration and free bleeding, followed by the formation of synechia, and later by cicatrization and contraction, and finally by symblepharon, which gradually became more and more complete, indicated the steady progress of the disease. The secretion of tears had been absent for about a week. The cornea showed small ulcer formations in the upper half, and the patient had noticed rapid loss of vision during the last week. Two weeks later the ulceration of the cornea was complete in the upper half, and the upper lid was tightly attached to the surface of the cornea. The vision was fingers at 6 in. The eye was kept closed nearly all of the time and the patient complained of great pain, which was worse at night.

Examinations of the urine were always negative. A von Pirquet gave no evidence of tuberculous foci in the body. The Wassermann reaction was also negative. The pain and general discomfort increased with the gradual destruction of the eyes. The condition of the nose and throat was much worse and breathing became difficult. There was free bleeding from the nose whenever the patient blew his nose or tried to remove the crusts and scales. He was unable to get about himself; and his general health and strength had been rapidly failing, and on examination of the body there were three well-formed bullæ found over the abdominal wall. The progress of the disease in the left eye was very rapid, involving twelve weeks in all to complete the destruction.

In the nose the whole of the visible walls of the cavity is covered by what looks to be a dirty, brownish, moist, shining membrane, but which is an exudate evidently closely incorporated with the subjacent mucus. It does not bleed and cannot be stripped off. There is evidently associated with the process a degree of fibrosis, which is manifested first, by the firmness with which the exudate or surface structure is bound to the subjacent parts; second, by the bloodlessness of the surface, and third, by the fact that at the back of the vestibule where the internal nasal chambers proper and their mucous surfaces begin, the introitus is much narrowed by a fibrous contraction. With this fibrosis there is no appreciable amount of deep infiltration, no true ulceration, no necrosis of soft tissue or of bone. There is a somewhat analogous lesion of the conjunctiva. There is no other lesion or history pointing to syphilis. It is not the clinical picture of membranous rhinitis, diphtheria, syphilis, or rhino-scleroma. The eye lesion resembles the blebs one sees in acute herpes or pemphigus of the throat. It resembles a lesion once seen accompanying a similar one of an acute nature in the nose and throat which was believed to be pemphigus.

Case 2.—German, aged 71, had been having trouble with her right eye for past two months. No previous eye disease, but has been having trouble with her nose and throat for nearly a year. Difficulty in swallowing and painful when she swallows any very hot liquid or solid food.

Vision. O. D., 20/70; O. S., 20/40; pupils 2·5 mm., react to light, accommodation and convergence, and the tension is normal. Right eye reveals some slight swelling of the lower lid with some crusts and scales along the edges of both lids. Extra ocular movements are normal. The cornea is clear, except near the limbus, where there is a slight dullness noted. At the inner, lower margin there is a peculiar, pale, whitish tissue formation, slightly elevated, with little or no congestion or engorgement of the conjunctival vessels. There is at times increased heat and redness of the lids.

In the lower lid the conjunctiva shows thickening with the formation of three or four cicatricial bandlike formations which are slowly but surely attaching the conjunctiva of the eyelid to that of the eyeball, and which may ultimately cause a complete symblepharon. The bandlike formations are more marked down and in, and down and out. They are slightly pale and have a peculiar lustreless appearance, looking dry, as does the rest of the conjunctiva of the eyeball—that is, affected by the disease. The conjunctiva of the inner half of the eyeball is beginning to extend and attach itself to the corneal epithelium layer. The inner surface of the upper lid shows a thickening and some increased redness with the same dead, dull, lustreless appearance, already described, in the lower cul-de-sac. There is now a slight tendency to entropion of the lower lid when the patient makes a spastic effort to close the eye.

One month later the general appearance of the eye was about the same, except that the lower cul-de-sac was reduced to about one-half of its normal depth. There was no marked encroachment of the tissue upon the cornea.

The examination of the nose revealed a great quantity of crusts, scabs and a dried, bloody exudate on the anterior portion of the septum on both sides of the nose, which caused great difficulty in breathing. On the posterior wall of the pharynx was seen a large, elevated brownish-white area which has all of the appearance of a bullæ. The mucous membrane of the rest of the pharynx was dull red in colour, dry and glazed.

Treatment.—The local use of boric acid wash, atropine, argyrol for a time, which was later discontinued and liquid albolene used.

Radium was recommended, but the patient refused to have it used. Liquor potassæ arsenitis was given in increasing doses.

The nose was cleaned up and freed of the scabbing, and ulceration by the daily use of a nasal douche and the application of a 40 per cent. ichthyol ointment.

The pharynx, when the patient was last seen, was smooth and clean, but showed a white cicatrix at the site of the bullæ.

QUININE IDIOSYNCRASY IN FIVE CASES.[1]

By J. A. Sinton, V.C., M.B.

During the last three years five cases showed marked idiosyncrasy to quinine.

Although slight cases of such a disturbance are comparatively common, the cases noted below were so marked that they seemed worthy of record. Some of the cases were also of interest on account of the effect of cinchonidine sulphate on them.

Bruce and Dilling [1] state that "large doses (i.e., of quinine) cause confusion of the mental faculties, noises in the ears and deafness, disorders of vision, headache, giddiness, muscular weakness, ataxy, and prostration." "The heart is slightly accelerated, and the vessels constricted, causing a rise in blood pressure. Larger doses weaken the heart and dilate the arterioles."

Manson [2] says that "it may also produce profound cardiac depression and gastric disturbance, and even death from syncope. Urticaria is another and not very uncommon effect of even small doses of quinine."

MacGilchrist [3] in his investigation of the cinchona derivatives found that the order of lethality of the cinchona alkaloids to guinea-pigs was (*a*) cinchonidine, (*b*) quinine, (*c*) cinchonine, and (*d*) quinidine; cinchonidine being the least lethal.

MacGilchrist [4] also found that "as regards unpleasant by-effects of these alkaloids, buzzing in the ears was most frequently associated with quinine and quinoidine; ambylopia with quinine and cinchonine; diarrhœa with cinchonine if administered over a week, and nausea with quinoidine. Cinchonidine even in large doses caused no unpleasantness of any kind."

A number of the above points are brought out in the cases recorded below:—

Case I.—B. K., European, aged 30, suffering from malaria. On the first day of his illness he was seen with a temperature of 103° F., and had taken quinine acid hydrochloride 10 gr. two hours previously. Another dose of 10 gr. was given the same night.

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[1] Abstracted from the *Indian Medical Gazette*, September, 1917.

On the second day the morning temperature was 100·4° F., and ten more grains of quinine were given. A similar dose was taken in the afternoon, and in the evening his temperature was 102·4° F. It was then noticed that his face was slightly swollen, but, as there were a lot of sand-flies about, it was thought that it might be due to their bites.

On the third day the temperature was normal, but, as there was very marked œdema of the face and eyelids and severe headache was complained of, the quinine was reduced to 10 gr. daily and saline purgatives were given. The œdema did not go down for several days.

In this case the idiosyncrasy took the form of a marked œdema of the face and eyelids, although only 40 gr. of quinine had been given in two days.

Case II.—B. S., Dogra, aged 28. When the regiment was paraded for prophylactic quinine on service, this man objected to taking it as he said he always got a rash all over his body and very severe headache after taking quinine. Quinine sulphate 10 gr. was, however, given in tablet form, and in about one hour's time he returned to hospital complaining of great itching, and had a very marked urticarial rash all over his body. This rash lasted for four or five hours and was accompanied by very severe headache. The buzzing in his ears lasted two days.

Case III.—A. S., Mohammedan, aged 38. After a dose of 5 gr. of quinine sulphate in solution this man developed severe vomiting and diarrhœa in about half an hour, and a diffuse urticarial rash appeared all over his body after one hour. This rash lasted five or six hours. He complained of vertigo and severe headache, and stated that similar symptoms had developed on previous occasions when he had taken quinine.

As he had a malarial infection cinchonidine sulphate 5 gr. was given, but it produced a similar result, but not in so marked a degree. His fever disappeared under treatment with tincture of cinchona, iron, and arsenic.

Case IV.—D. S., Sikh, aged 22. After the administration of quinine sulphate 5 gr. he had severe vomiting and diarrhœa with profound prostration. An urticarial rash appeared all over his body, and his eyes became very congested.

This case is of interest because cinchonidine sulphate in doses of 5 gr. did not produce this effect.

Case V.—H. B., Jat, aged 19. His history was that when given quinine as a prophylactic he had become semi-comatose and had severe vomiting and diarrhœa.

Cinchonidine sulphate 5 gr. was given in solution, and after fifteen minutes he was carried back to hospital in a collapsed condition. He was semi-comatose, his face and conjunctivæ were very congested, his pupils dilated, and his eyes turned up.

His skin was cold and clammy, his pulse imperceptible at the wrist, but heart-beats 80, and his temperature 95° F. Vomiting and diarrhœa were severe. An ounce of brandy was given and hot bottles applied. After about twenty minutes he became conscious and complained of chilliness and severe headache. In a few hours' time an urticarial rash appeared on the body. His urine contained no albumin nor blood.

On the next day he had recovered except for headache and buzzing in the ears, which lasted several days.

This case was very similar in character to one described by Van Poole [5], except that in his case the pulse was rapid.

It is interesting to note that such a small dose of cinchonidine sulphate caused such a profound disturbance, although it is the least lethal of the cinchona alkaloids.

These last four cases seem to be typical cases of the toxic effects of quinine on a susceptible subject.

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[3] MacGilchrist, A. C. "Cinchona Derivatives Inquiry." *Ind. Journ. Med. Research*, Vol. II, No. 1, July, 1914, p. 333.

[4] *Ibid.*, Vol. III, No. 1, July, 1915, p. 51.

[5] Van Poole, G. M. "A Case of Quinine Idiosyncrasy." *Military Surgeon*, Feb., 1913, Vol. XXXII, No. 2, p. 192, quoted in *Bull. Trop. Dis.*, Vol. II, No. 3, p. 152.

Review.

The Indian Operation of Couching for Cataract. Incorporating the Hunterian Lectures delivered before the Royal College of Surgeons of Eng-on February 19-21, 1917. By Robert Henry Elliott, M.D., B.S.Lond., Sc.D.Edin., F.R.C.S. Eng., &c., Lieutenant-Colonel I.M.S. (retired). London: H. K. Lewis and Co., Ltd. 1917. Price 7s. 6d. net.

Lieutenant-Colonel Elliott's book will be found of great interest not only to the specialist and general practitioner, for from a historical point of view it gives a full account of this operation which preceded cataract extraction in the practice both of the West and of the East, but also to all who are interested in the welfare of the people of India, as it shows what disastrous results follow in most cases the practice of the native operators.

Incorporated in this work are the Hunterian lectures delivered in February, 1917, dealing with the examination of fifty-four globes removed after couching, with plates showing the various pathological results which have followed.

Couching was first mentioned by Phyloxenes of

Alexandria, who lived in 270 B.C., whose writings are mentioned by Celsus, but have themselves been lost. The operation was introduced into Europe from the East, where it still survives.

The knowledge possessed by the Greeks and Arabs seems to have been largely forgotten in the Middle Ages.

At the close of the seventeenth century Brisseau of Tournay revived the operation. The French surgeon Daviel performed his first extraction in 1745. In 1785 Willburg introduced reclination instead of depression. In the former operation the capsule of the lens or the zonular ligament is torn through above, and the lens rotated around its lower attachment as on a hinge, and comes to lie in the vitreous with its posterior face downwards. In depression the lens is slid downwards and lies on its anterior surface.

Hirchberg, in 1894, published an article on couching after a visit to India, but owing to his ignorance of the natives it is not of much value.

In 1901 Henry Power, in the *British Medical Journal*, advocated the occasional performance of this operation. He could remember the time in which surgeons of repute used to perform it. However, I do not know that it has ever been done of late years by any ophthalmic surgeon.

There are two operations for couching: the anterior and the posterior.

In the anterior a needle or thorn is passed through the cornea, the anterior chamber, and pupil into the lens, which is depressed by raising the handle of the instrument.

In the posterior an incision is made in the sclerotic with a lancet, which is guarded by a roll of wool wound round it a little distance from its point, at a point some 8 mm. behind the cornea and 2 mm. below the horizontal line to avoid the tendon of the external rectus. Through the incision a copper probe is passed on to the back of the lens, which is pushed downwards from behind the pupil.

The avocation of coucher is hereditary in India. In the North they are of the Kayasth caste, an astute and well educated class. In the South they are Mahommedans. The latter are of an altogether lower class, wander from village to village, staying only a few days in the same place to avoid the after results of their work. Their clothes and instruments are extremely filthy. The Punjabis, on the other hand, are intelligent and decently clad, spend several months in the towns they visit, and keep in touch with their cases. Their results are much better. They use a preparation, the composition of which they keep secret, which is probably a local anæsthetic and contains cocaine.

The author had collected 550 cases of couching by March, 1912, and Major Kirkpatrick 350 operated by Mahommedans. The results were consistent throughout, and the author believes that the cases collected represent fairly the results of the operation. A look-out was kept for cases of couching in patients under treatment for other conditions, and he is confident that the cases coming under his observation were drawn from the mass of the people rather than from the couchers' failures. The unanimous opinion is that the results of the operation, especially in the hands of the Mahommedans, is appalling.

The age in 4·94 per cent. is under 36, in 69 per cent. it is between 40 and 50. In 10 per cent. of cases the vision is $\frac{1}{3}$ of normal or better, in 11·5 per cent. from $\frac{1}{4}$ to $\frac{1}{10}$, in 9·64 per cent. from $\frac{1}{10}$ to $\frac{1}{60}$, in 7·05 per cent. fingers at 2 ft. or less. If vision from $\frac{1}{10}$ to fingers be considered partial success, 16·69 per cent. would be such.

The figures show, however, a great preponderance of short histories in successful cases.

At the Madras Hospital in 1903 the figures were in the cases of extraction: Cures, 96 per cent. Poor results, 2 per cent. Failures, 2 per cent.

Senile cataract is not quite the same in the East as in the West. In India many eyes in cases of couching and extraction show undue distinctness of choroidal vessels due to absorption of retinal pigment, and this is specially the case where the extracted lenses were deeply pigmented. 55 per cent. of cases, and more especially these cases, complain of cyanopsia after extraction. This seems to point to migration of pigment into the lens. These differences between what is seen in this country, where most cases occur in old people whose life's work is mostly done, and the cases met with in India should emphasize these words of the author: "Remember that cataract strikes a man down in his maturity at a period of his life at which he has begun to reap the benefits of his earlier years of toilsome industry. . . . That men and women who ought to be burden bearers should be thrown as a burden on their relatives or on the State is a social evil of no small magnitude. One does not presume to blame either the State or the people. . . . The plain indication is to rouse the medical conscience of the country . . . to introduce a ferment, as it were, into the mind of India, and then to leave it to do its work."

Notes and News.

FIREFLIES.

An interesting account of the biology of fireflies is given by Williams in the *Journal of the New York Entomological Society* (No. 25, 1917). The functional use of the light seems to be to bring the males and females together. The eggs are for a short time luminous. The larvæ are luminous and mostly carnivorous, but the adults seem to be mostly herbivorous. The pupæ also show luminescence. In most of the six species of American fireflies larval life lasts for the most part of two years. All except one species hibernate in larvæ; the exception occurs in *Ellychina corrusca*, in which the adult hibernates.

Original Communications.

AN UNRESTRICTED TEST DIET IN THE TROPICS.

By W. E. Masters, M.D., L.R.C.P.
Chef de Service Médical, Central Africa.

In the *Lancet* of February 17, 1917, was an article on "The Unrestricted Diet of a Sedentary Worker," by A. D. Waller, M.D., F.R.S. When the paper reached me I had just carried out similar experiments in a tropical district of Central Africa, suspecting myself of over-eating. The resulting figures may be of interest to some of your readers.

The writer of that article was 60 years of age, and weighed 190 lb. He was surprised that he only required 2,244 calories (without alcohol). It will be remembered that 3,000 calories is the average given for a man doing average work.

In the Tropics the total amount ingested should

April 20, 1917.

6 A.M.		8 A.M.		1 P.M.		4 P.M.	
Milk	35 grm.	Quaker oats	60 grm	Potatoes	110 grm.	Bread	65 grm.
Sugar	n.b.	Milk	230 ,,	Meat	70 ,,	Butter	5 ,,
		Bread	51 ,,	Bread	22 ,,	Milk	180 ,,
		Meat	50 ,,	Butter	5 ,,	Sugar	n.b.
		Sugar	n. b.	Pudding	65 ,,		

7 P.M.

Meat	88 grm.
Potatoes	79 ,,
Pudding	207 ,,
Milk	60 ,,

Percentage present of— Protein	Fat	Carbohydrates	in		Total grm. yields in— Protein	Fat	Carbohydrates
4·0	4·0	4·2	Milk	706	28·2	28·2	29 5
—	—	96·5	Sugar	169	—	—	163·1
6·8	0·7	52·3	Bread	138	9·4	1·0	71·2
1·5	0·6	26·0	Potatoes	189	2·8	1·1	49·1
17·1	27·3	—	Meat	208	35·6	56·8	—
2·5	85·0	—	Butter	10	0·2	8·5	—
12·6	7·2	64·0	Quaker oats	60	7·6	4·3	38·4
				1,480 grm.	83·3	99·9	351·2

Total grm. of proteids 83·8 multiplied by 4·1 = 343·58 large calories.
,, fat 99·9 ,, 9·3 = 928·07 ,,
carbobydrates 351·3 ,, 4·1 = 1,440·33 ,,

Total ... ... 2,711·98 ,,

April 21, 1917.

6 A.M.		8 A.M.		1 P.M.		4 P.M.	
Milk	30 grm.	Quaker oats	75 grm.	Potatoes	63 grm.	Biscuits	25 grm.
Sugar	n.b.	Milk	185 ,,	Meat	113 ,,	Milk	30 ,,
		Meat	40 ,,	Pastry	95 ,,	Sugar	n.b.
		Bread	67 ,,	Pudding of—			
				Milk	100 ,,		
				Sugar	n.b.		

7 P.M.

Potatoes	120 grm.
Meat	65 ,,
Pudding of—	
Milk	163 ,,
Sugar	n.b.

Percentage present of— Protein	Fat	Carbohydrates	in		Total grm. yields in— Protein	Fat	Carbohydrates
4·0	4·0	4·2	Milk	508	20·3	20·3	21·3
—	—	96·5	Sugar	183	—	—	176·6
12·6	7·2	64·0	Quaker oats	75	9·4	5·4	48·0
17·1	27·3	—	Meat	218	37·3	59·6	—
1·5	0·6	26·0	Potatoes	183	2·8	1·1	47·6
6·8	0·7	53·3	Bread	67	4·6	0·5	35 0
2·6	3·1	21·0	Pudding	95	2·5	3·0	20·0
11·3	10·5	70·5	Biscuits	20	2·3	2·1	14·1
			Total	1,349	79·2	92·0	362·6

Total grm. of proteids 79·2 multiplied by 4·1 = 324·72 large calories.
,, fat 92·0 ,, 9·3 = 855·60 ,,
,, calories 362·6 ,, 4·1 = 1,486·66 ,,

Total ... ... 2,666·98 ,,

be in calories about the same as in a temperate country, but the carbohydrates should be a little increased to make up for the excessive amount of heat lost by the skin and for the greater evaporation by perspiration. The proteins should be a little reduced, as there is a reduced output of muscular energy. More fluids are taken in the Tropica, although it is to be remembered that quenching one's thirst by frequent drinks is a matter of habit and can be largely controlled. More fruit is also taken in the Tropics to counteract the tendency to constipation owing to the loss of body fluids by increased perspiration.

The experiment was carried out upon the writer, aged 33, weight 164 lb., resident in the same district of Tropical Africa two years, in an average mean temperature of 76·2° F., lat. 4° 49′ 3″, long. 18° 46′ 33″. My occupation was somewhat sedentary apart from two sets of tennis each evening.

It will be noticed that milk and sugar enter largely into the diet. This was due to there being plenty of goat's milk available for all purposes, the sugar being used in puddings and drinks. The diet was not varied owing to difficulties of supplies at that time. No alcoholic drinks were taken. Weak tea with milk and sugar and fresh lemon drinks with sugar were the chief potations. The milk and sugar are included in the figures.

The daily average was 2,877·84 calories. There is not the slightest doubt that if my occupation had been more manual the 3,000 calorie average would have been reached and probably exceeded.

APRIL 22ND, 1917.

6 A.M.

Milk	60 grm.
Sugar	n.b.

8 A.M.

Quaker oats	75 grm.
Milk	183 ,,
Sugar	n.b.
Rissoles of—	
Meat	62 ,,
Potatoes	31 ,,
Butter	5 ,,
Milk	90 ,,

1 P.M.

Rissoles of—	
Meat	66 grm.
Potatoes	33 ,,
Butter	8 ,,
Pudding of—	
Milk	177 ,,
Flour	30 ,,
Sugar	n.b.

4 P.M.

Bread	70 grm.
Butter	7 ,,
Milk	60 ,,
Sugar	n.b.

7 P.M.

Potatoes...	47 grm.
Rissoles of—	
Meat	56 ,,
Potatoes	23 ,,
Butter	5 ,,
Pudding of—	
Milk	150 ,,
Flour	30 ,,
Sugar	n.b.
Pineapple	87 grm.

10 P.M.

Milk	60 grm.
Sugar	n.b.

Percentage present of— Protein	Fat	Carbohydrates	in		Total grm. yields in— Protein	Fat	Carbohydrates
4·0	4·0	4·2	Milk	780	31·2	31·2	32·6
—	—	96·5	Sugar	260	—	—	250 9
12·6	7·2	64·0	Quaker oats	75	9·4	5·4	48·0
17·1	27·3	—	Meat	184	31·5	50·2	—
6·8	0·7	52·3	Bread	70	4·8	0·5	36·6
1·5	0·6	26·0	Potatoes...	134	2 0	0·8	34·8
2·5	85·0	—	Butter	25	0·7	21·2	—
14·0	1·9	71·2	Flour	60	8·4	1·1	42·7
0·5	0·3	10·0	Pineapple	87	0·4	0·3	8·7
			Total	1,675 grm.	88·4	100·7	454·3

Total grm. of proteids 88·4 multiplied by 4·1 = 362·44 large calories.
,, fat 110·7 ,, 9·3 = 1,029·51 ,,
,, calories 454·3 ,, 4·1 = 1,862·63 ,,
Total ... ... 3,254·58 ,,

SUMMARY.

	Protein	Fat	Carbohydrates	Calories
April 20, 1917 ...	83·8	99·9	351·3	2,711·98
,, 21, 1917	79 2	92·0	362 6	2,666·98
,, 22, 1917 ...	88·4	110·7	454·3	3,254·58
Total in three days	251·4	302·6	1,168·2	8,633·54
Average for one day	83·8	100·8	389·4	2,877·84 calories.

Explanatory Remarks.

n.b. means that the sugar has been included in the day's amount.
The figures for obtaining the calories from the food principles are those generally adopted by most writers.
The percentage of food principles in goat's milk are those given by Winter, Blyth and Richmond. Others were from Tibbles.
The potatoes used were sweet potatoes.
No alcohol was taken.

THE FREQUENCY AND DANGERS OF SYPHILITIC LESIONS OF THE MOUTH IN ARTHRITIC PATIENTS.[1]

By Dr. ALEX RENAULT.

President of the French Society of Dermatology and Syphilography.

(Translated from the French by W. E. MASTERS.)

To the great majority of French doctors an arthritic temperament constitutes a predisposition to a series of morbid manifestations, united by their alternation or even by their coincidence.

The troubles of health that engender arthritis attacking the divers systems of the economy and provoking multiple disorders are many. I will limit myself to point out the chief of these disorders, such as migraine and neuralgias, various dermatoses of which eczema is the prototype; periodic and violent coryzas, granular laryngitis, asthmatic attacks, granular angina, dyspepsia, hæmorrhoids, varices, biliary and urinary lithiasis, &c.

Is it possible to discover early the diathesis responsible for these divers manifestations? It is particularly at an adult age that arthritis can be unmasked. The patient has a facial expression and an outward appearance which in the majority of cases does not deceive one. He is attacked by premature baldness. The hair begins to fall in his case between the ages of 20 and 25 years, sometimes even sooner. His face is of a bluish tinge, his corpulency precocious. He may have hæmorrhoids or varices. Finally, in auscultating his heart one often hears at the base a reduplication of the second sound, indicative of an exaggerated vascular tension.

Suppose now that he had the misfortune to contract syphilis, the disease presents itself in his case by special characters. Does it expose him to any special dangers? In a word, does it tend to attack one organ more than another?

The clinic demonstrates that in the case of such a subject, the skin is in general, without doubt, but slightly attacked. The arthritic in the secondary stage does not manifest roseola or papular eruptions. His diathesis predisposes him in particular to the psoriasiform type, affecting in general the hands during the retarded secondary stage. Wherever it is when it concerns precocious efflorescences the elements are more discrete, and the duration ephemeral. On the other hand, the mucous membranes are affected otherwise. There is one region above all others which seems to be the point of attack for syphilis. That region is the buccal mucous membrane, and, moreover, it is necessary to know that the specific lesions do not invade them indiscriminately. They have a point of predilection: the lingual mucous membrane. They instal themselves as mistresses of it, recurring there without ceasing, and that, too, often, in spite of the most efficacious treatment.

Successively one notices some erosions, ulcerations, or fissures which seize, by preference, the edges of the tongue and begin to poison the patient, embarrassing speech, rendering mastication difficult, and not permitting, under penalty of pain, the use of spicy foods or liqueurs when such are at all strong.

But if the patient is a smoker, what dangers threaten him! what uncertainty awaits him! At the beginning general medication, together with external treatment and the suspension of the habit lead to the disappearance of the symptoms. But if the arthritic has neither the courage nor the sense to renounce tobacco, then some of the lesions will return which are only too often irremediable. The lips, the labial commissures, and the tongue become covered by white plaques. This last organ in particular becomes divided into lobules, which are separated by fissures more or less deep, which incommode the patient more and more as the time goes on.

It is then that he finds himself in the presence of an undoubted danger. Predisposed by his diathesis to morbid effects, cancer of the tongue awaits him, leading to one of the most frightful deaths I know.

If you wish distinct proofs of it, you will find them in the statistics produced by Professor Alfred Fournier and Poirier in the Academy of Medicine, in the 1906 sittings of October 30 and November 27. According to Fournier, the figure goes up to 84 per cent., and if it is necessary to believe Poirier, to 90 per cent., in such a way that one feels justified in saying that cancer of the tongue is the cancer of syphilitic smokers.

But, apart from these ideas, what must be the doctor's attitude who is called to attend an arthritic who is the victim of syphilis? The careful watching of the buccal mucous membrane will be his first and dominant preoccupation.

Without doubt, in the case of all specifics, it is particularly important before commencing mercurial treatment to put the mouth in a good condition. It must be cleansed of dental tartar and caries, which are so detrimental to the success of the medication. Then, concerning arthritics, these measures afford another advantage. One knows now that the irritation produced upon the edges of the tongue by a broken tooth is a constant appeal to the manifestation and persistence of erosive syphilides, and even of ulcerations, that the medication is unable to cure as long as the provocative cause has not disappeared.

But it is above all the smoking of tobacco, and I will also add the chewing of tobacco that must be distinctly forbidden. Upon this point the physician must be firm. It is certain, apart from this agent, that some syphilides can break down in the buccal cavity. The clinic demonstrates it. Yet how many of the more careful patients, not to speak of those obviously marked by syphilis, have the courage to renounce their dangerous habit at the outset? Otherwise the noxious effect of tobacco will show itself by the short duration of the cure of the symptoms and the repetition of relapses. How many times has it been my lot to meet patients who, freed from their buccal lesions by methodical treatment, have seen themselves go back again under the influence of some cigarettes? Then the patient is despondent, pretends that he will never be cured, when, however, he alone is responsible for the preoccupations which laid hold of him. In brief, tobacco is the sworn enemy of a syphilitic attacked by arthritis, and if he clings to the hope of coming back to it, it is only after long years that he will be able to permit himself to use it with moderation.

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[1] From *Le Monde Médical*, April.

It is easy to furnish proof of it in following up the facts of delayed contagion.

Before leaving this subject it is useful to recall that, apart from smoking tobacco, the patient must also be on his guard against all the causes of irritation to the buccal mucous membrane. Thus pepper, spices, highly spiced foods, wines rich in alcohol, and strong liqueurs must be discountenanced on principle. It is not that, in exceptional cases, the arthritic will not be able to use them, but because of the fear of creating a "*locum minoris resistentiæ*" serving as a *point d'appui* to specific lesions. Also, in this all-important question of the preferential localization in syphilis, in the case of every category of patients one has not only to consider their individuality, one must none the less preoccupy oneself with the dangers which can result from it with regard to his friends.

In normal conditions, in the case of a patient who treats himself methodically and conforms to a prescribed hygiene, the duration of syphilitic contagion will not exceed three years. The proof of it is that Professor Fournier, who has established the most extensive statistics that I know, since it deals with 19,000 cases, has only observed 5·77 per cent. of secondary symptoms supervening after the third year. In this figure the buccal lesions count for 2·28 per cent., of which 2 per cent. occupy the tongue exclusively. It is to be noted that the enormous group of 19,000 cases comprises all observations of syphilis, treated or not.

With regard to the facts of delayed contagion, syphilographs are unanimous in declaring that the most frequent cause of bringing back the lesions which lie hidden in the buccal cavity, and principally the lesions of the tongue and lips, are most frequently provoked, as I have said, by the smoking of tobacco in subjects attacked by arthritis. Do you wish proofs of it? These abound in the years which follow the termination of the secondary period—that is to say, the fourth and fifth years.

In the sixth year we find four observations by Professor Fournier of the contagion by the husband to his wife by buccal erosions.

In the seventh year an observation of a chancre of the vulva due to a lingual fissure of the husband (Barthélemy).

In the eighth year a fact of conjugal contamination by smooth plaques of the tongue (Ernest Besnier).

In the ninth year two observations:—

One by Professor Spillman of Nancy. A chancre of the lower lip in a female patient, contaminated by the lingual erosions of her husband, a smoker. The consequences of this contamination were: first an abortion, then the birth of a child which died from syphilis at fifteen months; a short time afterwards there was another birth of a child, which survived, it is true, but it was affected by divers dystrophies.

The second is by Maurice. It was of a chancre of the left lip, following some lingual erosions in the husband nine years and nine months after the onset of syphilis.

In the tenth year an observation by Doctor Bovero of a syphilitic erosion of the lip.

In the twelfth year two observations:—

The first by Doctor Wickham. A typical chancre of the lower lip communicated by the husband to his wife. The husband had at the time leucoplastic and herpetiform lesions of the tongue.

The second was by Dr. Barthélemy. An indurated chancre of the nipple of a nursing woman. The husband, a heavy smoker and attacked by herpetiform lesions of the tongue, was in the habit of manifesting his affection on the part affected.

In the seventeenth year, an observation by Professor Fournier. An indurated chancre of the upper lips resulting from contagion by the husband, an incorrigible smoker, suffering from relapsing erosions of the mouth and tongue.

In the eighteenth year, finally, an observation by Doctor Barthélemy. There was a chancre of the tonsil in the wife, infected by her husband, very given to tobacco, and afflicted by a sclerosis glossitis with fissures, erosions, and cracks.

All these facts, of which the authenticity is indisputable, demonstrate by the evidence the danger of lesions of the lips and tongue, which are to be feared more than is done by the majority affected, because cases of minute erosions are regarded by the patients as not at all offensive, above all when their syphilis is already of long standing.

CONCLUSIONS.

The doctor called to treat a syphilitic must inquire with care as to the patient's temperament. That temperament will be revealed by a minute interrogation, bearing not only upon the morbid phenomena of his previous history, but more upon those which his predecessors will have presented. If it results from this research that he finds himself in the presence of an arthritic, the physician must inform himself equally upon the habits of the patient, to know above all if he is a smoker. If this is so, tobacco will be formally prohibited, at least for a lapse of time, somewhat prolonged, since the clinical facts demonstrate some undeniable contagions up to the eighteenth year of the disease. Instructed by the prolonged manifestations of the specific lesions to which his temperaments or habits expose him, disasters are foreseen which can lead to a conjugal contamination.

If the patient is dismayed by the final prospect of a late cancer of the tongue, one may at least expect that he will have the energy to conform to that hygiene made necessary by his diathesis.

Whatever happens the doctor will have done his whole duty, and the patient alone will be responsible for not having either the will or the courage to conform to the valued advice resulting from knowledge and experience.

◆

Gonococcus Localized in Periosteum (E. M. Villapadierna, *Siglo Medico*, July 7).—A robust young woman in the second week of acute gonorrhœa developed pain at the front of the lower half of the tibia. The skin was apparently normal, but the region was tender along with the local pains. Under repose the lesion gradually grew less and less painful until merely a patch somewhat harder than the rest was left by the end of the week. The knee then became affected in the same way, the inflammation restricted solely to the internal condyle of the femur, the rest of the joint normal. There were no signs of syphilis, but gonococci were numerous in urethra and vulva. Under intravenous injection of sodium salicylate improvement followed, and soon no trace was left of the periostitis. The author has not been able to find any other case on record in which the process was restricted exclusively to the periosteum. Cases of pain in the heel bone for which the gonococcus was responsible have been published. In one such case, unpublished, the clavicle was affected likewise.

Recovery from Otogenous Meningitis after Repeated Operations (F. H. Quix, *Nederlandsch Tijdschrift voor Geneeskunde*, June 23).—A woman of 25 for a year had had otitis media with cholesteatoma formation in the mastoid. A radical operation failed to prevent the involvement of the labyrinth and development of Menière's disease. From the labyrinth the process invaded the dura and part of the cerebellum, the lumbar puncture fluid containing many pus cells and diplococci. Operative opening up of the labyrinth gave some relief, but did not reach the focus in the posterior cranial fossa. This was then reached and drained separately. By this means the extensive infectious process in the meninges, brain substance and around the spinal cord was finally cured. General anæsthesia had been applied on five separate occasions and—except for ligature of the internal jugular vein—about every operative procedure known to the otologist had been applied. The case teaches that when the cerebrospinal fluid contains abundance of pus cells and bacteria, this indicates a diffuse process in the meninges, but that repeated extensive operative measures and ample drainage with rubber drains and gauze above and lumbar puncture below may ensure recovery. It is the first case of the kind in the Netherlands in which the patient recovered after an extensive operation.

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DECEMBER 1, 1917.

FASHIONS IN MEDICINE.

To deem the medical world as one liable to be dominated by "fashion" may, in this scientific age, seem to be an incongruity and an unlikely thing to happen. Yet every medical man knows that it is so, although not perhaps willing to regard "fashion" as the proper term to indicate what is implied.

To express the situation, it would be better perhaps to use the phrase "swayed by opinion" rather than to style it a "fashion." Yet is it more than being "swayed by opinion," for every one, it is to be hoped, is open to conviction which this modified term indicates and yet not amounting to a "fashion." We look upon a "fashion" as applied to dress mainly, and the word has come to carry with it, therefore, a derogatory sense, which scientific men will resent. That they should follow a fashion, in the sense that the world of women is dominated to a pitch of slavery by the example set by a Parisian milliner to whom this or that filmy or scant attire is the ideal of womanhood's glory, is not to be thought of, nor such an opinion of a scientific body tolerated for a moment. So let it be; and having discovered any such hidden meaning as may seem implied in the term "fashion," and apologizing that such a word should have been selected in connection with medicine and medical men, let us for a moment look into the matter.

Time was when many healthy men were bled regularly once or twice a year, spring and autumn, as a hygienic precaution. In disease bleeding in illnesses of both men and women was prevalent, or shall we say, fashionable. That it was not scientific we firmly declare and steadfastly believe, or why is blood-letting at the present day unknown for men in health, and but seldom practised in disease? Was there any wholesome reason for the practice? That we do not believe so is testified by our neglect of this method of treatment to-day. One hears men say, "Ah! there is a great deal to be said in favour of bleeding, and it would do good in many cases did we only employ it." Then why not follow it? In the world of dress the same thing is constantly to be heard. "Ah! did we revert to the sensible attire of long ago it would be better than the suggestive attire of the woman of to-day for both our morals and our physique." It is difficult to dissociate the word fashion in both these cases, and were we to extend this parallel to other instances there would be nothing amiss in doing so. The soured milk craze has passed, leaving a wreckage from amongst the fragments of which here and there a useful relic is occasionally unearthed and applied with success, in much the same way as some old fashion is still followed by some early Victorian remnants amongst us. That a new disinfectant is taken up with avidity is almost a monthly experience in medicine to-day; and as with disinfectants so with scores of freshly discovered drugs do we find a fashion, which is announced just as the spring, summer and winter fashions are announced by the draper. It seems an unjustifiable liberty to take to-day to class scientific methods with the products of a milliner's brain, yet how often do we see the drug, a disinfectant, or dietetic method that was followed in the spring set aside in the autumn of the same year in which it saw the light.

Perhaps it is well it should be so, in medicine at any rate. It is well that a newly announced drug should be thoroughly tested; that the medical profession as a whole should all judge its qualities, be they beneficial or not; the mere statement by the discoverer or the result of experimental laboratory tests are insufficient to thoroughly establish a recent introduction; the method or substance must pass through the "mill" of practice before attaining a permanent place in the Pharmacopœia or in the practice of medicine or surgery. It would be unwise, no doubt, to stop this method of testing newly introduced matters; it is well that every medical man should enter the field of observation and report his experience. It may be said that it is a little hard on the patient; but it is not so really, for as often as not it is the patient that insists on being given the new drug or treatment, and if the doctor does not accede to the wish he is dropped and another, more "up to date" and "advanced," called in. It is well for some practitioners to prescribe the new treatment "whilst it cures," for, as its days are few, it must be taken up at once if at all.

In yet other spheres of practice are new methods evident. The various tests for tubercular infection which were in vogue for a time, a very short time, recently led to scares and tribulations which in some instances had untoward effects. These tests of reaction, whether of skin or conjuctiva, which obtained as positive tests of tuberculosis being at the root of evil can be viewed now with even amusement, but they held long enough to place the medical profession in a ridiculous position. A practitioner in a country district, ever ready to adopt recent introductions so that he should not be considered as falling behind in modern methods, found by these tests that a large number of farmers' wives in his district were suffering from "latent" tuberculosis; with the result that hurried consultations were held with specialists, who, on finding nothing clinically, were stated to be derelicts in medicine by this scare-mongering enthusiast following the teaching of crude observers. Clinical symptoms, he holds, are but late manifestations of infection, and too gross to be considered by the "advanced."

In yet other ways does the unrest in medicine show itself. The tropical experts are finding fault with quinine, both at home and abroad, in the treatment of malaria. Several state that quinine is uncertain, unreliable, and some go so far as to say that it is useless, and that they have given it up either as a prophylactic or as a remedial measure. It is perhaps well to recall the fact that malaria was treated by other drugs before quinine was known, also that quinine as we use it was not the form used originally; it was the bark of the cinchona tree in solution that was employed when the great discovery was made; but a decoction of cinchona is not the same as the salts of quinine derived from it; no more is morphia the same as opium. Both quinine and morphia are productions of the chemist, not of Nature. Emetin is not the same as ipecacuanha, and its virtues are different. It is the craze for "one drug one disease" that is misleading us, or is it not rather the so-called active principle of that drug? The extracted active principle is not a natural, but an artificial, element. Salvarsan can "break up" the acute symptoms of syphilis, but a course of mercury is subsequently required to cure the ailment. Emetin "breaks up" the acute symptoms of dysentery, but it does but little, if anything, for the post-dysenteric colitis which so frequently follows, and for which ipecacuanha is specific.

Our forefathers in medicine believed in combinations of drugs; we do not as a rule. We aim at following the "one-drug-one-disease" fashion; they believed in the opposite. Prescription writing is an almost forgotten "art." We retain the *superscription* ℞, but when it comes to the *inscription* or body of the prescription few of us even know what the term implies. Under the term "*inscription*" we have such legends as "*basis*," "*adjuvant*," "*corrective*" and "*vehicle*." Legends perhaps expresses best how the more modern practitioners amongst us regard the words, which convey but little meaning, and by which we are neither guided nor controlled. Yet each ingredient of these legends has its definite purpose, introduced with intent and because of its usefulness, and the whole in accordance with the findings of experience and observation. How different is the tendency to-day; a tablet or tabloid is prescribed consisting of usually a single drug, or it may be, at most, two; while the relative proportion of the two drugs contained is stereotyped and cannot be altered to suit the individual being treated.

The teaching of our professors of materia medica in our several universities and colleges to-day has but little effect upon the young practitioner, unless he has been a resident medical officer, before going into practice; he may never have been called upon to write a prescription for a patient before taking up practice on his own account, and he finds it much more convenient to dash off a prescription for a tablet or tabloid than to write out the ingredients of a mixture in full. To accomplish the latter he has not infrequently to look up the dose of certain medicines or to consult a text-book to see that incompatibles are not being prescribed.

The last mentioned "fashion" or habit is one which grows upon one, and it is difficult to see how it is to be met and set aside. The fact is since doctors have practically given up compounding their own prescriptions or making their own pills, they have lost that familiarity with their armamentarium of treatment which belonged to a bygone generation, and with that loss they have weakened their mode of attacking disease, just as a soldier unfamiliar with his weapons of defence falls before his better trained opponent.

This theme might be pursued, but space forbids, and perhaps enough has been suggested that it is time for us to review our present tendency to neglect experience and to rely upon investigators, by whom clinical accumulated knowledge is despised and by those out of touch with clinical work.

◆

We rejoice to know that Professor Sandwith, C.B., who lately returned in bad health from Egypt, has reached home safely.

Professor Sandwith has been engaged in Egypt by the Government as an expert adviser in tropical medicine, and through devotion to duty broke down in health. His many friends will be pleased to learn that he is convalescent, and we hope soon to find him resuming his work at home.

◆

Annotations.

Fœtal Athyreosis (G. E. Smith, *Journ. Biol. Chem.*, 1917).—A large percentage of the sows have given birth to hairless and otherwise defective young. Many of these pigs are born dead; others die in an hour or two, and few live more than twenty-four to thirty-six hours. The resulting loss in Montana amounts to about 1,000,000 young pigs annually. While the loss is heaviest among swine, there are numerous cases among sheep, and occasionally among cattle and horses.

The affected pigs are carried to the full term of gestation period, and though of full size are strikingly weak and low in vitality. Most noticeable in the appearance of a typical specimen is the absence of hair. Except for a few tactile hairs on the nose and a few around the eyes, the skin is smooth, shiny, and bald. This scantiness of hair varies from almost no hair through all gradations to the normal amount. The skin, particularly around the shoulders, feels pulpy, and is from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in thickness. It is semitransparent and apparently œdematous, but no fluid escapes on incision. The hoofs are thin-walled, short, brittle, and evidently in an undeveloped condition. The heart, in every case examined, has a persistent foramen ovale. The thyroid is dark red, sometimes almost black, and presents a most constant enlargement. A histological examination shows a uniform hyperplasia and a distension of the blood-vessels.

The symptoms of the affected pigs correspond in many details to those of myxœdema in its classic type, and to the symptoms of cachexia strumipriva sometimes described by the earlier surgical workers as arising after fœtal extirpation of the thyroid. The hyperplasia of the thyroid varies proportionately with the acuteness of the malady.

Evidence indicates the malady is caused by the malfunction of the thyroid. An examination of the glands of affected animals showed that they are abnormally large, that the iodine content is extremely low in comparison with that of normal pigs, and that in general the iodine content varies inversely with the degree of hairlessness of the skin. An iodine deficiency during the gestation period causes a lack of function and hyperplasia of the fœtal thyroid, resulting in an arrested development of the fœtus.

The iodine starvation of the fœtus depresses the physiologic activity of the fœtal thyroid, which causes the remarkably arrested development peculiar to this malady. The feeding of iodides is reported to have averted the appearance of fatal athyreosis in regions in which it would otherwise have been expected to occur.

Echinococcus Cyst of the Lung.—Marriotti (*Policlinico*, Surg. Sec., No. 3, March 15, 1917) reports the following case of primary echinococcus of the right lung:—

An aviator, aged 20, had complained of pleuritic pains on the left side of the chest which compelled him to enter hospital and remain under observation for about forty days. During this time he had paroxysms of coughing spells following slight exertion. The sputum was blood streaked. Though he had a good appetite and his general condition was good, he always felt tired. The sputum examinations were entirely negative. The lung signs were very indefinite, and no diagnosis was made.

On returning to duty he became worse, raising blood and pus. He then entered the Military Hospital at Udine, where an X-ray examination showed a uniform well-circumscribed area at the base of the right lung which was diagnosed as an echinococcus cyst. The good general condition of the patient, in contrast with the severe pulmonary affection, aided in excluding tuberculosis. The man had been in close association with dogs.

The seventh, eighth, and ninth ribs were resected, the lung and pleura sutured, with a crown of stitches to the wall to prevent retraction of the lung, and also to outline the field of operation. It was tamponed and skin sutured over it.

Two days later the second operation was done. The wound was packed with sterile gauze, no attempt being made to remove the cyst membrane in the lung as it was adherent and fragile. On the thirteenth day the lung was incised, the cystic membrane bulged out and spontaneously ruptured with the escape of about 100 grm. clear fluid. That evening the patient had a severe chill, high fever and a marked urticaria, which in a few hours disappeared with the fever.

A few days later with a Volkmann spoon the cystic membrane was removed. Convalescence was uneventful.

Reprint.

A METHOD TO FACILITATE THE ISOLATION OF THE CHOLERA VIBRIO AND OTHER ORGANISMS.

By Aldo Castellani, M.D., M.R.C.P.,

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The method here described is based on the action of specific and non-specific agglutinins on the bacteria with which the cholera vibrio is most frequently mixed in the material (stools) to be examined.

To explain the general principle on which the method is based the following experiments may be made:—

Action of Specific Agglutinins.

I.

Take two tubes of peptone water: inoculate Tube No. 1 with *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B.

Inoculate No. 2 tube with the same germs, but immediately before or after inoculation add:

3 to 5 drops agglutinating typhoid serum,
3 to 5 drops agglutinating paratyphoid A serum,
3 to 5 drops agglutinating paratyphoid B serum, and shake well.

Instead of the individual mono-serums, 3 to 5 drops of a high titre trivalent serum may be used derived from a rabbit inoculated several times with typhoid, paratyphoid A, paratyphoid B. Incubate both tubes at 37° C. for twelve hours and examine. No. 1 tube will show diffuse cloudiness; in No. 2 tube, on the other hand, there will be no diffuse turbidity, the growth taking place at the bottom; the medium will be quite clear, or will contain only a few flocculi, which will very quickly go to the bottom on centrifuging.

II.

To a tube of peptone water add:

3 drops typhoid serum,
3 drops paratyphoid A serum,
3 drops paratyphoid B serum.

Or instead of the mono-serums 3 to 5 drops of high titre trivalent serum may be added, derived from a rabbit repeatedly inoculated with typhoid, paratyphoid A, and paratyphoid B.

Shake well; inoculate the tube with *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, and *Vibrio choleræ*.

Incubate at 37° C., and examine after twelve hours. The medium will show diffuse cloudiness, often more marked towards the surface (with at times a pellicle), due to the growth of *V. choleræ*, and also a certain amount of bottom growth, and occasionally some flocculi due to agglutinated typhoid, paratyphoid A and B bacilli. These three bacteria have been influenced by the specific serums, which have had no action on the cholera vibrio In carrying out this experiment care of course should be taken to use typhoid and paratyphoid serums containing no coagglutinin for the cholera vibrio, or only in very small amount. Certain powerful typhoid and especially paratyphoid A serums may contain quite an appreciable amount of cholera coagglutinin, which is, however, in very small amount in comparison with the other coagglutinins, and may be removed by absorption.

III.

To a tube of peptone water add 3 to 10 drops of polyvalent *B. coli*, *B. pseudo-coli*, *B. coli tropicalis*, *B. neapolitanus* serum, or 3 to 5 drops of each of the respective mono-serums. Inoculate with *B coli*, *B. pseudo-coli*, *B. coli tropicalis*, *B. neapolitanus*, and shake well. Incubate at 37° C., and examine after twelve hours; the medium will be clear. Repeat the experiment, inoculating the medium with the same bacteria plus *V. choleræ*, and examine after twelve hours' incubation at 37° C.; the medium will show diffuse cloudiness, often more marked towards the surface (and at times a pellicle), due to the growth of the cholera vibrio, which has not been influenced by the serums added. Care of course should be taken to use serums containing no cholera coagglutinin, or only in minute amount.

Action of Non-specific Agglutinins.

I.

Add to a peptone water tube 3 to 5 drops of a very powerful agglutinating paratyphoid B serum, rich in specific and non-specific agglutinins. Inoculate the tube with *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, *B. aertrycke*, *B. enteriditis* (Gaertner), and examine after twelve hours; there will be no homogeneous growth, and no diffuse turbidity. The growth is at the bottom, and at times under the form of flocculi in the medium, and will quickly go to the bottom on centrifuging.

If, instead of a very powerful agglutinating paratyphoid B serum one of low titre is used, containing only a very small amount of coagglutinins, the medium will show a diffuse turbidity, due to the growth of the *B. typhosus*, *B. paratyphosus* A, *B. enteriditis*, while bottom growth and flocculi will be present, composed of agglutinated paratyphoid B bacilli, and also *aertrycke* bacillus, because generally any paratyphoid B serum contains nearly as much agglutinin for *B. aertrycke* as for *B. paratyphosus*. These two bacteria can be differentiated only by my absorption method, as demonstrated by Boycott, Bainbridge, O'Brien, and others.

II.

Add to a tube of peptone water 3 to 5 drops of a very powerful agglutinating paratyphoid B serum containing coagglutinins for the typhoid-paratyphoid group of micro-organisms.

Inoculate with *B typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, *B. aertrycke*, *V. choleræ*. Inoculate at 37° C., and examine after twelve hours. There will be diffuse turbidity, due to the growth of the *V. choleræ*, and flocculi and bottom growth due to the typhoid, paratyphoid, and *aertrycke* germs: the flocculi may easily be got rid of by a short centrifugation which will have no effect whatever on the non-agglutinated cholera vibrios. After a few hours longer there may be a distinct pellicle composed of vibrios. Of course, in carrying out this experiment, care should be taken to use a paratyphoid B serum which contains no coagglutinin for *V. choleræ*, or only in very small amount.

From the above experiments, and similar ones, a general method can be devised to facilitate the isolation of the cholera vibrio, the typhoid bacillus, and other germs. The method consists simply in adding to the medium in which the material is going to be sown, serums influencing—that is, agglutinating, and delaying the growth of—the germs we do not intend to isolate, while they do not hinder appreciably the growth of the particular germ, or group of germs, we want to grow.

Cholera.

For the isolation of the cholera and paracholera vibrios from stools the following technique may be followed:—

Inoculate peptone water tubes (it is of advantage to use centrifuge tubes) with the fæcal matter in the usual way, but before or immediately after making the inoculation add to each tube:—

3 to 5 drops polyvalent lactose fermenters fæcal bacteria serum (*B. coli*, *B pseudo-coli*, *B. coli tropicalis*, &c.), or the respective mono-serums may be used.
3 to 5 drops polyvalent non-lactose fermenter fæcal bacteria serum (*B. proteus* group, &c.).
3 to 5 drops paratyphoid B serum.

The addition of the last-named serum is made with the object of agglutinating and delaying the growth of the bacilli of the paratyphoid B and *aertrycke* type, which, in the Tropics at least, are not very rarely found in the intestinal fluid. Care should be taken, of course, to use serums containing no coagglutinin for the cholera vibrio, or only in very small amount. Or serums can be used from which the cholera coagglutinin—which is always in very much smaller amount than the other coagglutinins—has been removed by absorption.

The tubes are placed in the incubator, and the further steps in the investigation are carried out in exactly the same manner as with the ordinary methods.

(1) From the very surface of the medium a loopful of liquid is taken, examined microscopically, and the agglutination reaction with cholera serum carried out straightway.

(2) A small loopful from the very surface is smeared in the usual way on gelatine plates, bile salt neutal red agar plates, &c., and any suspicious colonies which will grow are further investigated.

The method may be applied to the isolation of the typhoid group of bacilli.

Typhoid.

To facilitate the isolation of bacilli of the typhoid-paratyphoid group the following technique may be used:—

(1) Inoculate with the fæcal matter to be investigated several tubes of taurocholate of soda peptone water, or Browning, Gilmore, and Mackie's telluric acid peptone water might be used.

(2) Immediately after, or better immediately before, the inoculation, add 5 drops polyvalent lactose fermenter intestinal bacteria serum, 5 drops polyvalent non-lactose fermenter fæcal bacteria serum (*B. proteus* group, &c.), taking care to use serums containing only a very small amount of typhoid coagglutinin; or serums can be used from which the typhoid coagglutinin has been removed by absorption.

(3) Incubate for twelve or twenty-four hours, then make plates on MacConkey, Conradi-Drigalsky, or similar media, from the most superficial portion of the liquid medium, and investigate further any suspicious colonies which may develop, testing them with typhoid, paratyphoid A, and paratyphoid B serums, &c. When there are many flocculi of agglutinated bacilli also in the upper portion of the tube, these may be got rid of by a short centrifugation. A short centrifugation with an ordinary electric centrifuge will cause the agglutinated bacilli to fall to the bottom, while it has practically no effect on the non-agglutinated germs in young cultures.

REMARKS.

In theory the method I have described is simple, and it should be possible by means of it to isolate in absolutely pure cultures the germs we want to grow to the exclusion of all those we do not want to isolate. In practice things are not so easy, and several difficulties are encountered. (1) The intestinal bacterial flora found in association with the cholera vibrio varies to a certain extent from country to country, from epidemic to epidemic, and even from individual to individual. Therefore, the serums may have to be varied, and serums have to be prepared influencing a large number of intestinal bacteria. (2) The preparation of powerful agglutinating serums against certain intestinal germs is far from easy. (3) Occasionally certain intestinal micro-organisms are at first inagglutinable by their homologous serums, becoming agglutinable only after several transplantations on artificial media.

In practice, therefore, we seldom succeed in agglutinating and retarding the growth of all the species of germs we do not want to grow, but merely succeed in agglutinating and retarding the growth of a certain number of them. Even this result is, however, of practical importance, and greatly facilitates the isolation of the germs we want to grow.

Abstracts.

PRISON DIETS IN INDIA AND EGYPT.[1]

We were very interested to receive by a recent mail an "interim report" of the Committee appointed by the Egyptian Government to carry out an investigation into the dietaries of prisoners in Egypt.

It will be within the memory of many of our readers that the Government of India initiated, some years ago, an inquiry into the dietaries of Indian jails.

The work connected with the Indian dietaries extended over a period of three years, and very extensive investigations were made regarding the food values of the different substances used.

The nutritive value of the great majority of the foodstuffs grown in India were experimentally ascertained, and on the basis of the percentage absorption obtained for the three great proximate principles, protein, fat, and carbohydrate, several new scales of diets were worked out. These new scales were so arranged that the absorption from them was on a higher level quantitatively and qualitatively than was the case in the old dietaries; at the same time, it was shown that there might be a slight saving in the expense of feeding the prisoner in a normal year.

The old scales of dietaries in India had been framed on the basis of the gross chemical composition of the different foodstuffs: the importance of the Indian inquiry is that, by long and careful experiments on large numbers of prisoners, the new dietaries are based on the actual nutritive values of those food materials. At the same time every effort was made to vary the diets as much as possible so that the monotony of continually eating the same foods day after day would be lessened, and that there should be a sufficiency of the all-important vitamines.

The Egyptian Government, early in 1914, began to interest themselves in the cost of feeding the prisoners, when it was discovered that the expense worked out at £E. 5 per head, compared with about £E. 2 per head in India. The question arose whether the high cost of the Egyptian diet could be justified, especially as the chief factor in the cost was found to be the inclusion of meat in the diet on a liberal scale, 10 oz. (about 7 oz. of meat and 3 oz. of bone) being purchased four times a week for each convict on hard labour. This largely exceeds in frequency and amount the meat habitually consumed by the class from which the bulk of the prisoners is drawn, and is said to be one of the causes which detract from the deterrent effects of prison life in Egypt. The Judicial Adviser in his 1913 report remarked: "Imprisonment, since it carries no social stigma, is no real deterrent. The work is no harder than the *fellâh* is accustomed to perform in the fields, the food and accommodation infinitely better!"

It is clearly indefensible to add to prison fare anything that is a luxury to the majority of the population. The law-abiding section of the community should not be taxed to provide for the lawless luxuries which they cannot afford for themselves. It was therefore abundantly evident that an investigation was necessary and a Committee was appointed, but as they were unable to agree upon an alternative diet that would be economical and sufficient, it was thought desirable to test by experiment alternative diets. These experiments are now going on, and the results will form the subject of a final report.

The history of dieting in the Egyptian prisons is not very dissimilar from that of Indian jails. Attention was drawn to the insufficiency of the then existing diets in 1895. In 1902 a Commission was appointed but did nothing. Prior to 1900 the health of the prisoners was very unsatisfactory, and outbreaks of infectious diseases were frequent. In 1905 the present three scales of diets, for non-labour prisoners, for ordinary labour prisoners, and for hard labour prisoners, was introduced.

After 1905 the death-rate abated considerably; the improved diet was the main cause in the drop in mortality.

The Committee have gone into the subject exceedingly thoroughly, and have investigated the feeding of the prisoners in a scientific and very sensible manner. They laid their fingers on the weak spots of the present scales at the outset, viz., the anomaly of feeding prisoners to a large extent on meat, which, to the Egyptians of the class to which prisoners in general belong, is a luxury—the cost of the meat is more than one-third of the total cost of the hard labour diet. Further, the existing diet, like the old Indian diets, is based on the analogy of European and American practice. The Committee state very rightly that the Egyptian diet should be based on Egyptian habits, with due regard to climatic differences, and that the guiding principle should be that the dietaries satisfy all physiological requirements, should be consonant with the food habits of the general population, and at the same time be not unduly expensive.

The Committee, after carefully studying the reports on Indian foodstuffs, found the composition and physiological value of Egyptian diets for ordinary labour and hard labour convicts is 2,846 calories and 2,911 calories respectively, with 82 grm. and 95·6 grm. of available protein. They suggest improving the diets while reducing the cost.

Owing to the War and other causes, the method of arriving at the real nutritive value of the foodstuffs in use in Egypt—the method adopted and carried out on an extensive scale in India—was not considered feasible.

The Committee attach great importance to the protein element in the nutrition and the maintenance of the health of the prisoner: they state that the solution of the problem of the most satisfactory diet depends upon the value of the protein which is absorbed from that diet; they even point out that, unfortunately, that is the question upon which physiologists are most at variance; and, as most of the experiments have been made on Europeans of quite different food habits and under different climatic conditions, the recorded results of the percentage of protein absorption for different foodstuffs in Egypt would require correction.

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[1] Abstracted from the *Indian Medical Gazette*, September, 1917.

The Committee's interim report has valuable information, and discusses most of the problems that face the investigator when asked to frame satisfactory dietaries. Observations on the food of the Bedouin and a note on two family budgets are particularly interesting and instructive. The Bedouin is a rice-eater to a fairly large extent. After working out in detail the physiological values of the existing diets and comparing the prices with the food value, it goes on to discuss the protein requirements of the prisoner—the most difficult and most contentious of all the problems with which physiologists have got to deal. After dealing with the scales laid down by different authorities for the protein requirements of the body, it works out the necessities of the Egyptian prisoner according to:—

Chittenden's	scale at	47·24	grms.	daily
McCay's	,, ,,	82·7	,,	,,
English hard labour	,, ,,	125	,,	,,

Stress is laid on the biological value of the protein offered in the diet, i.e., the value of the different proteins in replacing the tissues of the body, taking meat protein as the standard of comparison.

It agrees with McCay's conclusions as to the amount of nitrogen necessary per kilogram of body-weight; and quotes his conclusions that it is for the welfare of the prisoners and probably to the advantage of the State that the level of nitrogenous interchanges should be such as to provide liberally for the waste of everyday wear and tear." . . . "While acknowledging the force of the different arguments for the reduction of the level of protein metabolism, we have had sufficient evidence in our work in India to confirm us in the opinion that a liberal supply of protein (absorbable) is the all-important element of a diet, without which, no matter how plentiful the other constituents may be, physical fitness, capacity for work, and power of resisting diseases cannot be expected."

AURAL INSTRUMENTS OF THE CHINESE BARBER.[1]

By A. M. Dunlap.

The barber rarely completes his shaving without passing the razor over the entire cheek and nose. Occasionally he may shave as near the inner canthus of each eye as he thinks he may safely go. In watching them, it seemed that this last act was more for the pleasurable sensation it gave the customer than for the removal of hair. It is just possible, too, that the barber feels he has not earned his fee of a few coppers unless he does his part to make it "a man's job."

Just as our barbers ask if we will have a shampoo, the Chinese wishes to know if his customer will have his ears shaved. This practice is very old, since it is followed by practically all the Oriental races. It is likely that, many years ago, the barber became the logical man to remove wax and detritus of all sorts from the ears, and as he became more adept at it, he added the preventive measure, as he considered it—the shaving and cleaning of the ears of his customers. This practice could not have survived, however, had it been at all disagreeable. Many Chinese, questioned as to why they have it done, invariably give the reason that they like the sensation.

The barber understands how to pull the ear upward and backward in order to straighten the canal. He uses, of course, no head mirror, but if he is in a room he will stand so that the light from the window passes over his shoulder. His first manipulation consists in shaving all the hairs he can see, in the external canal, by using a long narrow knife. Then, by means of long forceps and curved needles, he picks away the particles of hair and epidermis which do not come with the knife. A feather ball at the end of a slender piece of bamboo is then twirled in the ear to remove the finer particles.

All the hairs and the superficial layers of epidermis are removed, and while there is no blood to be seen on the outside of the ear, there were many minute hæmorrhages where the knife had gone too deep. The epidermis, deep in the canal where the razor had stopped, is rough and ragged.

Aside from the accident of cutting away too much, the ear drum may be punctured with the long needle. Many a patient has volunteered the information that the barber gave him pain at his last visit, since which time he had had a running ear. It is conceivable that a needle, which is never sterilized, might cause an infection if thrust through the ear drum. Examination of such cases may show an irregular perforation, which might come from pulling the point of the needle sidewise; or a pin-point perforation, resulting from a direct thrust.

Perhaps the most common sequel of this pernicious practice is the growth in the external canal of soft granulations, which later become quite firm. These condylomata come, undoubtedly, as a result of the repeated irritation with the knife and the accompanying infection. A daily clinic of fifty will usually produce four or five patients with their external auditory canals either partly or totally blocked with these masses. Many such patients have absolutely no middle ear complications.

Furunculosis and diffused inflammation of the external meatus are extremely common as a direct result of the ministrations of the Chinese barber, particularly among children and young adults.

The barber is not to be blamed for all the injuries to the ear which result from manipulations. The duck-down ear-dusters, before mentioned, are sold broadcast by street hawkers for use "in the home." The ear-spoon forms a part of every Chinese married woman's head-dress. It is made of jade, ivory, gold, silver, or brass, according to her station in life, and used for every purpose from ear cleaning to tooth picking.

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[1] Abstracted from *Boston Med. Surg. Journ.*, September 27, 1917.

THE TREATMENT OF CARRIERS OF *ENDAMŒBA HISTOLYTICA* WITH OIL OF CHENOPODIUM.[1]

By E. L. Walker and W. Emrich.

The treatment of endamœba carriers was conducted at the Hospital of the Madeira-Marmoré Railroad, Amazonas, Brazil. The oil of chenopodium used had been kept exposed to tropical light and temperature for over a year, and had undoubtedly lost some of its potency. The treatment found most effective consists of (1) magnesium sulphate, from ½ to 1 oz at 6 a.m.; (2) oil of chenopodium, 16 minims in gelatine capsules at 8 a.m., 10 a.m., and 12 noon; and (3) castor oil, 1 oz., containing chloroform, 50 minims, at 2 p.m. This dosage is for adults; for children it should be reduced according to age. The administration of oil of chenopodium in gelatine capsules obviates all the disagreeable odour and taste of the oil.

There are, however, several essential factors in the treatment which need careful consideration. One of these is the preliminary purgation with magnesium sulphate, which is a very important part of the treatment. The purpose of this is twofold, first to remove the excess of fæcal matter from the intestine which envelops and protects the endamœbæ and dilutes the chenopodium, and, second and most important, to bring the endamœbæ out of their protective cysts and subject them in the vegetative condition to the action of the chenopodium. This preliminary purging, which should not merely consist of the routine administration of the salts, but should also secure free fluid bowel movements before the chenopodium is given, to be a most essential factor for successful treatment. Indeed, the success or failure of any method of treating endamœba carriers with encysted endamœbæ in their intestines may depend on this preliminary purgation to get the endamœbæ in the unprotective vegetative stage. Secondly, the chenopodium must be administered while the stools are fluid—that is, at a short interval (two hours) after the purgative, in order that it may reach the endamœbæ while they are still in the vegetative stage. Finally, the stools of the patient must be examined repeatedly after the treatment by one capable of identifying *E. histolytica* in the resting and encysted as well as the motile stages.

The action of oil of chenopodium on unencysted *E. histolytica* was tested by giving this drug to patients with acute endamœbic dysentery and examining the stools of these patients at frequent intervals during and following the ingestion of the chenopodium. It was found that oil of chenopodium is an active endamœbicide for the vegetative stage of this organism. The motile endamœbæ, which were very numerous in the stools at the beginning of the treatment, were replaced by increasing numbers of dead and disintegrating endamœbæ until, after the third portion of the divided dose had passed through the intestine, living organisms were no longer present. Owing to the fact that any endamœbæ surviving treatment rapidly multiply, and to the nature of treatment, which precludes the repeated administration at short intervals, the aim of the chenopodium treatment is a "*therapia sterilisans magna.*"

Of the fourteen carriers of *E. histolytica* treated with oil of chenopodium, all of whom were men, ten were apparently cured and four remained uncured. However, there is no reason to doubt that the latter might have been cured if they had received satisfactory treatment, with especial reference to the preliminary purgation, or if they had received further treatment. Some of the relapses were due to unsatisfactory preliminary purgation. These two patients were peculiarly non-reactive to magnesium sulphate, and successive treatments were absolutely without effect, until free fluid bowel movements were finally obtained in one only after a second dose of magnesium sulphate, before the chenopodium was administered. In the relapses of the other patients, unsatisfactory preliminary purgation may have been responsible since the administration of the treatment was not always personally supervised.

In the ten apparently cured cases six resulted from a single treatment, one after a double treatment with one day's interval between, and three after three treatments following two relapses. The dosage of chenopodium in the ten successful treatments was 16 and 16 minims in two cases, and 16, 16, and 16 minims in eight cases. Although the success of the treatment depends more on the preliminary purgation than on the dosage of chenopodium, and cures have been obtained with 32 minims of chenopodium, yet 48 minims is surer in its results.

Notes and News.

EFFECT OF COLD ON MALARIA PARASITES.

In refutation of the statement that at a temperature of 60° F. the development of malaria parasites in Anopheles is arrested, King, in a contribution to the *Journal of Experimental Medicine* (vol. xxv, p. 495), finds that *Plasmodium vivax* (tertian parasite) in *A. quadrimaculatus* survives a temperature of 80° F. for two days, and a mean temperature of 46° F. for seventeen days. He shows also that *Plasmodium falciparum* (æstivo-autumnal parasite) in *A. quadrimaculatus* the sporonts could resist 35° F. for twenty-four hours.

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[1] Abstracted from *Journ. Amer. Med. Assoc.*, May 19, 1917.

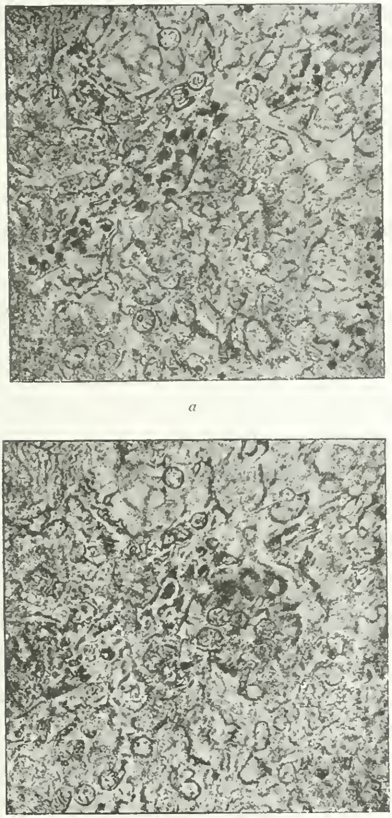
Original Communications.

A NOTE ON THE SOLUBILITY OF MALARIAL PIGMENT.

By A. C. Stevenson, M.D., D.P.H.
Wellcome Bureau of Scientific Research.

When engaged in examining tissues from the West Coast of Africa I was troubled by the large amount of pigment, both crystalline and amorphous, which was present, and which obscured much of the finer detail when examinations were made with a high-power objective. Much of this pigment was undoubtedly malarial in origin, and the remainder was possibly due to imperfect fixation with formalin and the subsequent hæmolysis.

Section of pancreas unstained, showing vessels containing corpuscles infected with malarial parasites.



a. Untreated, the pigment is plainly seen.

b. The same section treated with acid alcohol, the pigment has disappeared.

In an endeavour to get rid of this latter pigment I tried acid alcohol (1 per cent. HCl in alcohol), and found that it removed in under four hours all the pigment present in sections 5 to 8 microns thick.

Similar results were got when known malarial tissues (Zenker and alcohol fixed) and films (wet and dry fixed) were experimented on. On the same malarial tissues 1 per cent. solution of HCl was tried alone for over twelve hours without effect. There was obviously no reason to try alcohol by itself.

From a practical point of view it is therefore desirable that acid alcohol should never be used for treating sections when the object is to demonstrate malarial pigment, as if even used for a short time the finer granules would be removed.

MALARIAL MIMICRY.

By Sagh (Major) A. E. Kamar.
Medical Corps, Egyptian Army, Shendi.

Contents.—*Introductory—Case I—Case II—Remarks—Acknowledgments.*

Introductory.—Although from time to time valuable papers and classical books have been written upon the subject of *pernicious malaria*, still I believe but few practitioners realize how closely malaria can mimic other diseases. The old cry *drunk* or *dying* still applies in tropical towns; for example, the police arrest a man because he is extremely noisy and is apparently drunk. Next morning the man is seen to be very ill, or even dying. A doctor is sent for, and an examination of his blood shows that there are many subtertian parasites.

Again, as another example, a man may be brought to a hospital in a *stuporous or melancholic* condition and with a normal or subnormal temperature, and it may be considered that he is a lunatic and ought to be transferred to an asylum, and yet while these arrangements are being set in action a blood film reveals the true history of the case, and the diagnosis of pernicious malaria is made.

Take as another example, which has just come to my notice. A man who has never been known to have malaria attends a concert, during which he slips off his chair and is found to be unconscious, and is thought to have an apoplectic seizure, and yet an examination of his blood shows malarial parasites.

Further, in a country like the Anglo-Egyptian Sudan, which has recently suffered from a severe epidemic of *cerebrospinal meningitis*, and in which cases still occur, I have found patients suffering from pernicious malaria which produces a clinical picture by no means unlike this disease.

I therefore venture to think that an account of two cases which are by no means rare here, and which recently came under my care, one after the other, with only a short interval, might be of interest to some of my fellow practitioners who are engaged in combating disease in countries as malarial as the Sudan, and I record these cases the more readily because they responded so well to treatment.

Case I.

Malaria mimicking Acute Mania.—A Berbereen male, aged 25, and engaged as a member of the crew of a Government barge plying between Zeidab and Wad Hamed on the Nile, was brought to the hospital at Shendi, apparently in a state of *acute mania*, which was reported to have commenced four days before.

He was wild and so extremely violent that he had been put into chains and under a guard for fear that he would do mischief to himself and other people, as before being chained he had attacked some men who happened to be near him at the time.

When I saw him he was still violent, talking incessantly, and never replying correctly to any question.

His previous history did not point to any tendency toward insanity. He had not suffered from syphilis, and he was said not to take alcohol.

He had no fever, but his tongue was coated, and his spleen was enlarged and extended well down below the margin of the ribs.

His comrades informed me that he had recently suffered from attacks of fever, and I knew that Zeidab and Wad Hamed were famous for their malaria. Taking these facts and the enlargement of the spleen into consideration, I diagnosed malaria, and lost no time in giving the patient intramuscular injections of 10 gr. of quinine bihydrochloride twice daily.

Next day the patient was calmer and less talkative, and I continued the same dose of quinine daily for three successive days, and noted that each day the patient became more and more rational.

I then discontinued the injections and gave him quinine and tonics by the mouth, and in fourteen days from the time I first saw him the man was discharged restored to his normal mental condition, in good bodily health, and with his spleen reduced to about a normal size.

The point which I desire especially to emphasize is that during his illness, as I saw it, his *temperature never rose to above the normal.*

Case II.

Malaria mimicking Cerebrospinal Meningitis.—A boy, aged 12, and a native of Shendi, was brought to the hospital in an unconscious condition, with dilated pupils, very slight corneal reflex, involuntary passage of urine, twitching of the fingers and toes. His rectal temperature was 103° F., his tongue was coated, heart normal, and liver of ordinary size, but his spleen was enlarged, and reached downwards some three fingers' breadth below the costal margin.

According to his father, the boy had been quite well and playing along the sandy banks of the Nile on the previous day till about noon, when he felt ill, and ran home complaining of fever. His father was absent at the time, and on his return in the evening found the child lying unconscious, in which condition he remained until he was brought to the hospital next morning.

It appeared to me that there were three points for diagnosis: Was the case *cerebrospinal meningitis*, was it *malaria*, or was it a *combination of both?*

The more important from a public health point of view was the first-named. I therefore performed lumbar puncture and obtained the cerebrospinal fluid, and I took nasopharyngeal swabs from the throats of all contacts.

I then took blood films from the patient, and sent the whole series of specimens to the Wellcome Tropical Research Laboratories, some 100 miles distant by rail.

As it would be some time before I could get a report, I treated the *possible malaria* with intramuscular injections of quinine, and the *possible cerebrospinal meningitis* with injections of *antimeningococcal vaccine* 200 millions.

Next day the patient partially recovered consciousness and recognized persons around him.

On the third day his speech began to return, but his brain was not clear.

On the fourth day the laboratory diagnosis arrived, and it was "*meningitic form of pernicious malaria,*" and was based upon the presence of subtertian parasites in the patient's blood and the absence of meningococci in the patient's cerebrospinal fluid. The meningococci were also reported to be absent in the swabs from the contacts.

I now pushed the quinine, and the patient made an uninterrupted recovery.

Remarks.—The points of interest with regard to the above cases are:—

(1) In both the illness began suddenly.

(2) In both fever was not a prominent sign.

With regard to the first case, it may be of interest to note that if he had not been a Government servant his relatives would certainly have taken him to the nearest fakir in order to drive the evil spirit out of him and he would have died, but being a Government servant they had no alternative except to consult a Government medical officer, and hence he lived.

Further, I desire to invite attention to the fact that as the man was to all intents and purposes a case of mania he was quite irresponsible for his actions, and was liable to commit serious crimes for which, if he recovered, he might have received severe penalties, as it might be considered that his madness was feigned and not real, especially as it was so transitory. I asked the man when he recovered whether he remembered anything he had said or done, and he stated, and I believe truthfully, that he remembered none of the things told to him.

Another point of importance is to remember that violent delirium like the above can be caused by poisons, but there was no evidence of any poisoning in this case.

I believe that in malarial districts, if there is a sudden appearance of insanity in a previously sane person, or if there is a sudden committance of a violent crime without any sufficient reason, the possibility of a *malarial infection* should be borne in mind, and should be definitely excluded by blood examination and by quinine therapy.

With regard to the second case, it shows in my opinion that the diagnosis of cerebrospinal meningitis without lumbar puncture is not trustworthy.

Acknowledgments.—I have much pleasure in expressing my graitude to Colonel Carroll, D.S.O., R.A.M.C., Principal Medical Officer of the Egyptian Army, for permitting me to publish this article, and to Dr. Albert J. Chalmers, Director of the Wellcome Tropical Research Laboratories at Khartoum, for much kind assistance in my work at Shendi and in the preparation of this paper.

Khartoum,
July 7, 1917.

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BATHS AND BATHING: BRITISH AND TROPICAL METHODS COMPARED.

THE custom of the daily bath which obtains amongst the better educated classes in Britain is followed for the most part with slavish uniformity. Some take a warm bath, some use water with the chill off, whilst others pride themselves upon their cold morning tub. The value and benefits of each of these are upheld by the enthusiasts who follow the custom, but one seldom hears of the evils which each may give rise to.

The young lady who gets into a bath of warm water, and, after lying covered by the water, turns on the hot-water tap from time to time until the water reaches a temperature of 110° F., 115° F., or even 120° F., and remains on her back for, say, one hour on end, with her head on a pillow, a book in her hand, and, it may be, a cigarette between her lips, represents the extreme of indulgence in the matter of bathing. This indulgence, which may even be termed a debauch in bathing, can only have one end, and that a bad one. No one, not even the strongest, can stand such an ordeal for any length of time without detriment; yet do we find young girls following a regime which would cause disaster to a Hercules: these victims of custom and indulgence are found in a short time in the consultant rooms pouring forth a tale of weakness, of giddiness, of loss of appetite, of palpitations, shortness of breath, of insomnia or the opposite condition of drowsiness and inordinately long sleeps. Unless the doctor whom she consults happens to inquire about the bath the patient takes, the causes of her complaint remain a mystery, and the trouble continues and all is obscure. The experienced physician will, however, never omit to inquire as to the baths taken, for if he does the patient will never volunteer a reference to them, but hides the truth rather, for she is herself well aware of the cause, but does not like to confess, knowing well that her particular form of debauch will be stopped and her enjoyment thwarted. The cold bath is mostly affected by men, and the early morning tub becomes to them a fetish, which they follow with a persistency worthy a better cause. Some carry their indulgence to so great a pitch that they will break the ice in a pond or lake, and plunge into the chill water with a sense of bravado in the belief that they are "hardening" themselves, another form of fetish which obtains largely amongst young men. Examination of a group of these men by the writer elicited the fact that many (30 per cent.) had albumin in the urine as the result of their foolhardiness, which, although no doubt temporary, leads in time to permanent ill-health in the form of anæmia, heart irregularities, and, it may be, permanent kidney trouble. The young man of the morning cold tub who presents himself for a life insurance examination not infrequently gets rejected, or an increased premium is demanded because of albuminuria. The learned doctor shakes his head, looks serious, and reports the matter to his company. Had he inquired about and understood what the cold morning bath meant to many men he would have advised him to desist and come up for examination later on. He seldom does, or if he does it is not that he has grasped the cause of the passing trouble. Temporary albuminuria in young men is a common ailment, and the cause is not far to seek.

The old man with the "fresh" complexion, the sprightly frame of mind, and the parade of youthful gaiety will insist it is the cold morning tub that does it. "Nothing like it, my boy; bucks you up and keeps you fit. Look at me," &c., *ad nauseam*. Yes, look at him; with a face the colour of a beetroot which he assumes to be a fresh complexion, a high colour as he calls it. His cerebral vessels are as his facial, and one morning he is said to have slipped in his bath and injured himself. The slip was due to a hæmorrhage from a small vessel in his brain, and the subsequent tale is soon told.

The daily morning bath, be it warm, cold, or of water with the chill off, is a recent introduction into Britain and to Europe. Before the fifties of the nineteenth century baths were not a feature of the daily life, bath-rooms were unknown in the homes of the well-to-do, baths were "uncommon rare," and "washings a bother." The daily bath was introduced by the young men, military or civil, coming home from the East and West Indies, who demanded their before-breakfast tub, to the consternation of the parental home. He was asked by his astounded mother, "Aren't you well, dear?" and regarded by his persistency as a "crank" in this matter and perhaps in others owing to his peculiar habits, the product of a tropical life. The fashion was set by such men, and it spread to the young men at home and to young women in course of time with even more untoward results than in the case of men. The so-called bath of the Tropics, as practised by the natives, is not the bath as we follow it. To the oriental when he washes, and in many countries even amongst the poorer classes, the "bath" consists of a splash of hot water and then a splash of cold. It is taken standing often in the open, but amongst the better-off folk the "bath" is taken in a tiled corner of a room as a bucket of hot and then a bucket of cold emptied over one, and then a rub down with a cloth, and often the *pantry* cloth. This form of bathing in its physiological effects has a very different effect to immersing the body in a "tub," be the water hot or cold. The "cold" water in a tropical country is not cold; it is only relatively so, but in a northern climate it is cold in a thermometric sense, and consequently has a potency of physiological action which all too often induces a pathological state. The bath as we use it in Northern Europe has never been followed by any people (except perhaps the Japanese, and their baths are hot, not cold) until about fifty years ago. We are in the second generation of the experiment—a new experiment for mankind—and the results are not as yet to hand. We do know the results of the oriental bath, for it has been in use for hundreds, nay, thousands of years, and it has proved its usefulness and benefits, and shown that it is physiologically and hygienically sound in principle and practice. It is time to review the recently introduced habit and to guide our young folks, and if possible the older folk, amongst us also in its use, pointing out its possible dangers. These have been referred to above, and it behoves medical men to give attention to the subject, and to appreciate the very powerful physiological agent placed in the hands of the public which, if applied wrongly, is apt to develop into a pathological factor in the national life. As the Japanese attribute some of the characteristics of their national features to persistent use of very hot baths, so we may unreservedly attribute the prevalence of temporary albuminuria and other evils to baths in very cold water.

One thing is certain, that the nearer we follow a splash of hot and a splash of cold for our baths we are following a custom which has proved itself by the experience of ages to be wholesome, and one which we can adopt with benefit and safety.

Our soldiers at the Front do follow this well-proved regime. The officers in our Army gained their knowledge of bathing for the most part in the Orient itself, and consciously or unconsciously to them they prescribe that system for the soldiers. In our admirable casualty clearing stations even at the Front we find the splash of hot and the splash of cold system in vogue. Here we find bathrooms with no baths to get into, but instead overhead bunches of three rosettes, beneath each of which three soldiers take their stand and have a shower of hot water for three minutes, followed by a shower of cold water for two minutes. Baths (tubs) as we know them are only given to soldiers who are "ill," suffering from skin ailments for the most part, and the remark of the mother, mentioned above, "Aren't you well, dear?" when a morning tub is demanded by her son home from the East is not so outrageous an exclamation as bathing enthusiasts are apt to imagine.

The writer would urge the necessity of every medical man inquiring into the bathing habits of their patients; for every medical examiner for insurance to bear this factor in mind; and for those of us who find albumin in urine, irregular heart action, and other physical phenomena apparent in the young men they examine for appointments in a tropical country to be alive to the fact that the troubles met with are of a physiological nature merely, and in almost every case attributable to following the custom of the morning tub of cold water and its effects upon growing lads.

J. C.

Abstracts.

BLADDER DISTURBANCES DUE TO NERVE LESIONS.[1]

By Gilbert Smith, M.D.

Boston.

The most common disturbance of the bladder from the neurologic point of view is tabes dorsalis.

An extraordinary case was a girl of 9 years with tabes and nocturnal enuresis, and twelve cases of tabes in children were seen within two years.

Another lesion of the spinal cord which may cause bladder disturbance is myelitis. If the lesion occurs in the lumbar cord, according to Gowers,[2] it will cause loss of vesical reflexes which results in dribbling without retention. If above that region, the reflex is first lost, and then becomes hyperactive. In other words, there is first retention, then involuntary voiding.

Trophic disturbances in myelitis may cause ulceration of the bladder.

Syringomyelia is the occurrence of a glia-lined cavity in the gray matter of the cord. The symptoms are necessarily variable, depending on the location and size of the cavity. Loss of sexual desire and of testicle pains occur. Analgesia of the bladder and persistent priapism are occasional symptoms. In regard to bladder disturbances, these are not the rule, although at time appearing, usually late in the disease. When appearing early they are apt to be transitory. They may be sensory or motor, irritative or paralytic. Cystitis is not infrequent in the later stages of the disease. With the dorsolumbar type of the disease, involvement of the bladder and rectum is not infrequent, while in the sacrolumbar type it is usually present.

The patient, a woman of 30, a domestic, with syringomyelia exhibited marked bladder symptoms, and complained of painful, burning micturition of eight weeks' duration. Urination was followed by dribbling, tenesmus, and a desire to urinate again. The urine contained pus and colon bacillus. Cystoscopy was done under spinal anæsthesia. Considerable trabeculation of the bladder wall with a distention of 6 oz. was noted. Both ureters were catheterized; a small amount of pus and a growth of colon bacilli were obtained from each. Röntgenoscopy and the Wassermann test were negative. The peculiar thing was that during her twelve days in the hospital the patient continued to have constant severe spasms of the bladder, in spite of every kind of local treatment. Also, she had, on several separate observations, a residuum of 6 oz.

The diagnosis of syringomyelia was made because of atrophy of the small muscles of the hands and various sensory disturbances.

Multiple sclerosis, or disseminated sclerosis, is characterized by the occurrence of small patches of sclerosis in the spinal cord, or brain, or both. These patches are due to the degeneration of the included nerve tissue, which is later replaced by neuroglia. Their size varies from that of a pea to that of a walnut, and they involve the white matter primarily. Sometimes the nerve roots are affected as well.

The etiology of this condition is unknown. It occurs most often between the ages of 25 and 35 years, and although naturally the symptoms vary according to the location of the patches, the most usual symptoms are loss of muscular power in the limbs, a jerky inco-ordination, nystagmus, and staccato utterance. The individual is prone to outbreaks of emotion, manifested either by laughter or by tears. Babinski's sign is always present; the absence of abdominal and epigastric reflexes is a valuable point in the diagnosis (Gowers).[1]

Frequently there is associated a weakness of the bladder; there is inability to hold the urine as well as usual, and there may be urinary incontinence at times. . . . Urgency is an early symptom, and is due to hypertonicity of the bladder muscle. Intense spasms of the sphincter may occur, causing retention; later in the disease incontinence is present practically always.

Sixty-five per cent. of cases were of the spastic type, usually accompanied by bladder disturbances. The bladder is involved in from 75 to 80 per cent. of all cases. The patient feels a sense of insufficiency, and has to strain to pass water. Complete paresis with incontinence is rare. The many ups and downs in the bladder symptoms are remarkable. The disease is progressive, with intervals of improvement, but care of the bladder as in tabes would seem to be indicated.

The bladder manifestations of multiple sclerosis were reproduced with striking accuracy in the following case:—

M. C., a nurse, aged 28, was seen about one year ago. Four years before, while in training, she became "run down" and very nervous. Accompanying her breakdown were bladder symptoms—great frequency and inability to hold the water. Association with insane persons led her to fear that she might have some nervous disease, so she had an examination of the spinal fluid. This was normal. She returned to work and has remained at it, in spite of a sense of weakness in the legs, and what she characterized as a "weakness of the bladder." At times she wet the bed at night.

She was a rather pale, tired-looking girl. The pupils reacted normally. There was no Romberg; the knee-jerks were normal; general examination was negative; the kidneys were not palpable; the pelvic organs were normal. The urine by catheter was hazy, revealing no sugar nor albumin. A centrifuged sediment showed some pus cells, a few red blood cells, and vast quantities of staphylococci. No tubercle bacilli were found. Röntgenoscopy was negative for stone.

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[1] Abstracted from the *Journ. Amer. Med. Assoc.*, October 20, 1917.

[2] Gowers: "Diseases of the Nervous System," 1903, 1, 247, 361.

[1] Gowers: "Diseases of the Nervous System," ii, p. 543.

The bladder contained 4 oz. of residual urine, with distention of 8 oz.; the bladder wall showed a fine trabeculation; the mucous membrane was clean. The ureteral orifices were normal. Both ureters were catheterized with a flow of normal urine.

Not being awake to the diagnosis, and finding the urethra abnormally red and granular, she was treated with urethral applications, sandalwood oil, and bladder lavage. The residual urine remained about 4 oz. throughout July, August, and September. In November her chief trouble was fatigue in the front of the legs. The bladder symptoms improved a very little, the greatest improvement allowing rest from work, bromides and belladonna.

The patient was very emotional, laughing one moment, crying the next. On December 22 the residuum was only 1½ oz, neurologic examination found a positive Babinski, negative abdominal and epigastric reflexes, and positive ankle clonus—in short, she unquestionably had multiple sclerosis.

Treatment started with solution of potassium arsenite (Fowler's solution) and the application of electricity over the bladder. Whether or not as a result of this treatment, the patient showed remarkable improvement. The residuum cleared up, the urine became normal, and for two months she wet the bed only during menstruation. She has had a slight remission, but generally speaking is much better, and has started to work again.

This case is a striking example of the vesical manifestations of multiple sclerosis. Bladder trouble was practically her only complaint, yet there was the definite background of a nervous disease which escaped detection on routine physical examination.

The presence of residual urine should have suggested at once the necessity of a more thorough nerve examination.

Syphilis of the brain and cord, whether of the diffuse type or circumscribed, as in gumma, may produce disturbances of the bladder, varying with the location and extent of the lesion.

Tuberculous meningitis may do likewise, retention of urine coming on in a person with tuberculosis is an early symptom of an invasion of the meninges. Four cases, all proved by necropsy, support this theory.

Neuritis of alcoholic origin may produce incontinence, and that post-diphtheritic neuritis can result in retention the following case will show:—

In 1909, J. K., aged 62, a labourer, was seen with a residuum of 30 oz. His only previous illness had been diphtheria twenty years before. At that time he had stoppage of water, and had had dribbling of urine, with pain at the beginning of urination, and he has had difficulty in starting the stream ever since. There was slight frequency at night. The reflexes were normal. The patient's general physical condition was negative except for some cardiac hypertrophy. The prostate was not enlarged nor tender. The catheter passed easily and drained 30 oz. of foul urine. He was seen by the consulting neurologists, who found evidence of nerve lesions. Cystoscopy found nothing obstructive, and through the bladder condition due to his diphtheria epididymitis set in, then pericarditis. He died, and at necropsy the kidneys showed suppurative nephritis, the ureters and pelvis were dilated, the bladder showed a thickening of the walls with fibrous induration in the region of the outer coat and much hypertrophy of the trabeculæ. Between the hypertrophied trabeculæ in several places, there were smooth walled diverticula, the largest being about 3 cm. in the greatest dimension. The prostate showed very slight, if any, enlargement of the lateral lobes. There was a very small eminence in the situation of the median lobe. The prostatic urethra was free and somewhat dilated.

That various forms of insanity are accompanied by disturbances of the vesical and rectal sphincter is, of course, well known; the bladder disturbances are usually late symptoms.

Not so much in them as in the field of organic nervous diseases, such as multiple sclerosis, syringomyelia and tabes, is co-operation between urologist and neurologist most necessary. The most troublesome symptom of those conditions may be vesical, and the first assistance sought by the patient may be from the urologist. It is well for the latter to have in mind the fact that a nerve lesion may be the cause of marked hyperæsthesia of the bladder, characterized by great frequency, or of unexplained residual urine in cases without urethral obstruction.

The diagnosis of nerve lesions with the cystoscope is difficult, because the bladder manifestations are necessarily limited; we have practically only three things; first, hyperæsthesia; second, retention; third, relaxation of the sphincter, with perhaps dribbling. Dribbling may be caused by any one of a number of different nerve lesions, and these different nerve lesions are not always easy to reconcile with the pathology of the disease.

Unexplained bladder disturbances may be caused by a peripheral neuritis, as in a case of post-diphtheritic paralysis, in which a peripheral neuritis limited to the bladder was the thing that was causing the symptoms.

DISCUSSION.

BRANSFORD LEWIS: During the last ten years or so there have appeared from time to time discussions of prostatic obstruction by very able men, like Thomson Walker of England, Albarran and others of equal prominence, in which they spoke of cases of prostatic obstruction with what they termed unrecognizable causation. They, to their own satisfaction, excluded nervous origin and let it go at that—apparently what used to be termed idiopathic, whatever that means. These cases are obscure forms of prostatic obstruction, and are due to certain physical conditions that were not recognizable according to the methods employed for diagnosis, such, for instance, as a moderate degree of contracture of the vesicle neck that was not recognizable by the various methods of instrumentation, either endoscopic or cystoscopic, until one got one's finger right there and felt the contracture that until then was not recognizable.

Another form of obstruction that ought to be given more consideration is that of syphilitic influences through the spine, producing interference with the evacuation of the bladder without there being an evident tabes or any lesion that was apparent excepting on the most careful analytic study of the case. And that applied to younger individuals as well as to the old ones, and also to inherited syphilis. One patient had been subject to numerous surgical operations; he had had five major operations done on him, and he was only about 18 or 20 years of age, and he had never been able to urinate with any degree of satisfaction. He had never acquired syphilis, but he did have inherited syphilis that had bestowed on him this stigma that had required all his attention all of his life. It was proved by the Wassermann and other tests, and he improved under the influence of antisyphilitic treatment.

John T. Geraghty, Baltimore: In connection with Dr. Smith's paper and Dr. Lewis's discussion, I would disagree with Dr. Lewis. I was much astonished a few years ago to find some cases of obstruction to urination for which we could find no cause. We supposed, of course, that they were probably unrecognized cases of contracture of the vesical neck. Operation to divide the vesical neck, however, gave no relief. We have had now a series of six cases of that type in which all of the clinical findings were simply those found with a spinal cord lesion; sometimes dilatation of the vesicle orifice, residual urine as a rule, and all of the classical symptoms that go with the spinal cord cases that Dr. Smith has mentioned. Two of these cases have come to necropsy, and we were able to obtain a most complete necropsy, including the central nervous system, and the most careful studies of the central nervous system, and the bladder and the urinary apparatus failed to show the slightest cause for the obstruction. There is only one explanation which I can think of which will account for these cases, and that is that we will probably have to admit the possibility of a peripheral lesion; that it is possible to have a peripheral neuritis which will affect the bladder. That is hard to understand, because if there is a degeneration of the peripheral nerves, sooner or later there should be evidences of that in the spinal cord. In these cases there was nothing in the spinal cord to indicate that the nerves had been injured. Furthermore, these two patients, instead of having atrophied bladders, had hypertrophied bladders. In each instance the vesical orifice was dilated; there was no valve formation, no diaphragm.

W. F. Braasch, Minn.: The value of cystoscopic data in the early diagnosis of neurologic conditions is not generally appreciated among neurologists. The co-operation of the urologist and the neurologist is often very necessary. Whenever there is any doubt as to whether or not a patient has a central nerve lesion he should be referred to a competent urologist for cystoscopic data. In a high percentage of the cases such data are of great practical value to the neurologist. The well-known changes in the bladder following cord lesions are of two types, namely, trabeculation and dilatation of the internal sphincter. The dilatation of the internal sphincter takes place, in the majority of cases, in the later stages of nerve lesions. The first change is trabeculation, which, as you know, with a cord lesion is quite typical of a large percentage of cases. The trabeculæ appear ridge-like and are confined largely to the upper portion of the bladder. Without any nerve lesion, however, patients are frequently seen with iritable bladders which on cystoscopic examination appear trabeculated similarly to nerve lesions. We cannot always, therefore, depend on the cystoscopic picture, particularly in the early stages of nerve lesion.

Edward L. Keyes: One diagnostic point has been of so much value. It is most rare for a tabetic with bladder paralysis to show active ankle-jerks, though a number of patients have shown normal knee-jerks. Therefore, it seems wise to examine all of our prostatics for ankle-jerk. There are cases in which we cannot elicit the ankle-jerk, and in which there is no cord lesion; nevertheless, the absence of the ankle-jerk will frequently put us on the right track. In one instance, while the neurologist was in the ward examining the man, a laboratory report on the spinal fluid came in. The neurologist said that although the patient had absent ankle-jerks and had loss of deep muscle sense in his calves, nevertheless he had no spine lesion. Whereupon the report was read showing characteristic tabetic changes in the spinal fluid.

Another sign frequently observed in tabetic bladders is a gaping of the ureter due to paralysis. Sometimes if one can turn the cystoscope in the right direction one can see a quarter to half an inch up the ureter. If a ureter catheter is introduced through the cystoscope in tabes the patient is unable to feel contact at any point within the bladder.

W. Ayers: We can make one of the earliest diagnoses of beginning tabes in any form by examining the bladder. A patient had been under a first-class man in New York, who had been treating him with bladder lavage for about a year. On my first observation I immediately asked him if he had had syphilis. He said he had. I tested him for the lesions commonly shown as tabetic, for instance, the pupil, knee-jerk, &c. The pupil reacted perfectly, the knee-jerk was increased, the ankle-jerk was increased. Wassermann was four plus. The only symptom the patient had was a twitching In washing his bladder his legs would twitch. After a course of sodium cacodylate all of his bladder symptoms disappeared. His jerk has not disappeared, but he is beginning to have a loss of contraction of the pupils to light, and that seems to indicate that he was in the pretabetic stage. By seeing these patients early, recognizing them at once from the bladder, the possibly severer effects of tabes may be blocked off.

THE RELATION OF THE SPLEEN TO CERTAIN OBSCURE CLINICAL PHENOMENA.[1]

By William J. Mayo.

The spleen is derived from mesoblastic tissue, and is probably concerned largely with filtration of certain substances from the blood, and the product of its activities is delivered to the liver through the splenic vein, suggesting at once what clinical experience has shown—its relation to the blood and to the liver. It may perhaps be most aptly compared to the kidney, also derived from mesoblastic structure, and also without true secretion, a filtering organ. Cushny well expresses the modern view that the kidney has no true secretion, but that it filters certain substances from the blood in proportion to the absolute amount in the plasma, so-called no-threshold bodies and other threshold bodies only when their percentage in the plasma exceeds certain values.

The spleen has a very scanty nerve supply from the sympathetic system, but it does contain a considerable amount of non-striated muscle fibre. Keith has demonstrated that the non-striated muscle has the power of originating contractions independent of nerve supply and exhibits a most primitive form of control. This attribute is shown wherever non-striated muscle is to be found. The intestine, like the heart, has two beats, the first once or twice to the minute, which we call peristalsis; the second, twelve to twenty times to the minute, which acts as the heart of the portal circulation. The spleen has what might be called a beat which consists of an enlargement following food intake with a gradual resumption of its normal size after several hours, showing a definite connection with the digestive function, which is indicated again by the fact that its blood supply is from the cœliac axis, the same source of supply as that of the derivatives of the foregut, the stomach, the liver, and the pancreas. The intramuscular injection of epinephrin contracts the spleen one-third in size.

The blood entering the spleen is peculiar inasmuch as it comes in direct contact with the splenic pulp, the smaller blood-vessels having lost their elastic coats. This renders the spleen fragile, and leads readily to traumatic or spontaneous rupture resulting in intraperitoneal hæmorrhage or hæmatoma within the splenic substance. The latter condition results in cyst, the most common type of tumour of the spleen. This peculiarity of the blood-vessels also renders the spleen extraordinarily susceptible to the influence of radium, which acts with vigour on the single-coated blood-vessels, non-striated muscle, and the nuclei of cells.

The blood supply of the spleen is enormous, and it may be readily seen that a large percentage of the blood of the body passes through the spleen every hour.

Relations of the Spleen to the Blood.

The blood may properly be termed a tissue, consisting of erythrocytes, leucocytes, and platelets, in which the plasma is a fluid medium taking the place of intracellular substance. The white blood is the most primitive, derived from the mesenchyme cell. The earliest heart was possibly a lymphatic heart, circulating white blood, which merged later with the venous heart, leaving among other evidence the lymphatic connection of the thoracic duct with the venous system. Animals which have only one kind of blood have white blood. The fœtal blood is produced by the lymphoid and adenoid structures of the body, including the liver and spleen. From this standpoint leukæmia could be considered a cancer of the blood in which there is an uncalled-for production of functionless white cells, just as carcinoma is due to the unlimited production of embryonic epithelial cells and sarcoma of embryonic connective-tissue cells. The earliest blood discovered in the fœtus is the white, and the red cells are probably derived from the white cells. The spleen loses its power to produce red blood at birth and the liver at about the fifth fœtal month, but the spleen retains its power for a limited production of white cells throughout life and assumes the function of the destruction of worn-out red cells, which is shown by a relative increase in the white cells and of hæmatin in the splenic veins over other veins in the body.

Relation of the Spleen to the Liver.

The liver is the great organ of defence. Its extreme importance is shown in the fact that it is one of the few organs which has the power of regeneration. We know that the liver destroys bacteria and protozoa and detoxicates poisons, both biological and chemical, which are brought to it from the portal circulation. The liver bears the most important relations to bodily metabolism, especially to the formation of sugars from carbohydrates and the development of amino acids from proteins. It receives through the portal vein all the nutritive material derived from food through the gastro-mesenteric system, and also the nutritive values in the material which the spleen obtains from the blood.

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[1] Abstracted from the *Medical Record*, October 27, 1917.

The diseases of the liver are little understood, and while a vast amount of work has been done, the nature of its metabolic activities is to some extent a matter of conjecture. Among its most important diseases are those which result from the intrahepatic development of connective tissue causing cirrhosis, a process which may be widespread or localized. The cirrhotic liver may be and is enlarged more often than we are led to think because of our more complete understanding of the alcoholic cirrhosis of the Laennec type, the so-called hob-nail or gin liver. Yet there is no fundamental difference between the atrophic cirrhosis and the hypertrophic cirrhosis of the beer drinker in which fatty tissue smoothes out the connective tissue contractions and increases bulk. The cirrhosis secondary to splenic disease, if portal, is of the atrophic or hob-nail type, showing that the cause concerns protein, not fat metabolism. In biliary cirrhosis, on the contrary, the liver is always enlarged. Three types of hepatic cirrhosis stand out prominently—the toxic, represented by the alcoholic portal cirrhosis; the protozoal, of which syphilitic cirrhosis is representative, and the bacterial, of which biliary cirrhosis from common-duct infections is a type. In the portal cirrhosis the connective tissue is related to the portal while jaundice is a late one. In biliary cirrhosis the connective tissue is associated with the biliary canals, jaundice is an early manifestation and ascites a late one. Biliary cirrhosis is even less well understood than the portal type, and there are various subdivisions, such as the pigmentary (hæmochromatosis) and the so-called Hanot's cirrhosis; the latter designation evidently includes cases of hæmolytic icterus, and serves only still further to confuse the issue.

Nature, in dealing with poisonous substances within the body in a general way, employs two methods: (1) Detoxication and elimination, and (2) encapsulation. Portal cirrhosis may be looked on as failure to detoxicate and eliminate certain diffuse poisons, and eventually there is an attempt at encapsulation of the noxious agents, resulting in the introduction of connective tissue about the portal radicals. The enlargement of the spleen, which so often accompanies portal cirrhosis, suggests that the primary source of these poisons may be in the spleen, and in some cases of portal cirrhosis in which we have removed the enlarged spleen, the results justify the presumption. In Banti's syndrome the portal cirrhosis is a late stage of splenic anæmia, and even in advanced disease the removal of the spleen often cures, the liver regenerating to a marked degree. In portal cirrhosis supposed to be primary, the spleen may be enlarged to a considerable extent without being manifest until a late stage. Sometimes it is a moot question whether the liver or the spleen was first affected—all going to show how little we know about the whole subject.

The biliary cirrhoses, in many cases at least, have their origin in infections in the common duct, associated with gallstone disease. In such cases the spleen may or may not show great enlargement. In other cases in which no such infection exists in the common duct, the spleen may be found to be very large, and suggests the possibility that it has carried to the liver toxic materials which have safely passed through the portal side, but have exercised a large influence on the hepatic cells and the smaller bile ducts. This we know to be the fact in connection with hæmolytic icterus, as the removal of the spleen promptly relieves the jaundice. The enlarged liver thus may not be a true biliary cirrhosis, as we had thought, but possibly in part at least an excess of function causing hepatic hypertrophy as well as cirrhosis in the attempt to care for the erythrocyte debris destroyed in the spleen and carried to the liver by the portal vein.

Relation of the Spleen to Bacteria and Protozoa.

Not infrequently living organisms are introduced into the human economy, and such introduction initiates bodily resistance. Vaughan has pointed out that a patient has typhoid during the prodromal period, but that which we call typhoid is Nature's defence manifestations. Preventive serums, such as vaccination for small-pox, typhoid, &c., act to educate the cells of the body to resistance. It is probably true that at times organs such as the tonsils which permit bacteria to enter the bloodstream are acting as immunizing agents, allowing the early introduction of a few bacteria which act to cure rather than to cause the disease. Phagocytes may be considered educated defence cells ready to engulf bacteria on contact, and perhaps depend on bacteria for their nourishment. In typhoid fever the spleen becomes enlarged as a result of its straining function. The accumulated bacteria which have been strained out of the blood are sent to the liver for destruction. A failure in elimination of the bacteria from the spleen to the liver may result in multiple or single abscesses containing pure culture of typhoid bacillus. We have operated in several such cases.

Enlargements of the spleen from chronic sepsis are not uncommon, and may act as secondary distributing centres of infections. Fæcal infections in various parts of the body may act as the primary source of the bacterial invasion. Septic endocarditis is a notable example. In eight cases we have removed a very large spleen showing the picture of sepsis—infarcts, &c. This type of chronic splenomegaly is most apt to be confused with splenic anæmia.

While tuberculosis of the spleen is considered by some observers as never primary, this condition has occasionally constituted the only known focus in the body, and the removal of such a tuberculous spleen has permanently cured the patient. We have removed the enlarged spleen in three instances for tuberculosis supposed to be primary in the spleen. One patient died within the year from tuberculosis, and we must conclude that there were other undiscovered foci. The remaining two patients have recovered and remain well.

Pathogenic protozoa, such as the plasmodium of malaria, the spirochæte of syphilis, &c., produce chronic splenic enlargements from which it may be extremely difficult to dislodge the organisms. Jonnesco and others have removed the spleen for the ague cake of malaria, but with a higher mortality. Newer and better methods of quinine therapy render so radical an operation unnecessary—at least, very seldom indicated.

Spirochætal hibernation in the spleen is not unusual, and failure to eradicate the disease by salvarsan and prolonged mercurial treatment may result in a syphilitic spleen which permits not only luetic reinfection of the body, but also causes a high grade of chronic anæmia. In four cases of this type removal of the spleen has promptly cured the anæmia, and the lues has thereafter quickly responded to renewed treatment. In all of these spleens either spirochætes were found or gummata in spleen or liver were demonstrated, showing again the relation of the spleen to hepatic disease.

It seems that certain data which tend to establish that:—

(1) Enlargements of the spleen, not due to new growths, are associated with definite pathologic changes in the blood and the liver.

(2) The enlargement of the spleen is often the result of agencies which are not primarily connected with the spleen, and in many cases the splenomegalia is a work-hypertrophy, a secondary, not a primary, cause of the disease with which it is connected.

Pernicious Anæmia.

We have removed the spleen fifty times for pernicious anæmia. In each case the diagnosis was well established, and the spleen, with four exceptions, was above normal in weight. In some instances the spleen was greatly enlarged, weighing up to 2,330 grm.

There has been no definite relation between the size of the spleen and the seriousness of the disease, nor was there any direct relationship between the result of the splenectomy and the size of the spleen removed. This of itself is a suspicious circumstance. The benefit derived from splenectomy, generally speaking, has followed the removal of a definitely enlarged spleen. Since practising transfusion in advance of splenectomy, when the blood has been seriously deteriorated, we have had no deaths. There were no operative deaths in the last thirty-two cases. In many cases after initial improvement by transfusion and splenectomy relapse has taken place, followed again by improvement after transfusion. We have carried some of these patients along for months in fair health by repeated transfusions; as many as thirty have been given to a single patient. Following each transfusion there would be marked benefit, with gradual depreciation, until transfusion again became necessary. It has been believed that the introduction of new blood stimulates the hæmotopoietic organs, and this is probably the true hypothesis in patients whose bone marrow is not too severely damaged. Yet it should be noted that immediately after the transfusion, in certain cases, the anæmia is relieved, the hæmoglobin brought up from 10 to 30 points, and the red cells advanced appreciably, only to be followed by a gradual decline. These are the predominately myelotoxic types. It is an interesting conjecture whether or not the patient may live on the work of transfused blood as well as be stimulated to the formation of new blood. A probable explanation is that the life of the red corpuscles is much longer than we have thought, and that the anæmia returns in proportion as this fresh aid is used up. The significant blood changes in pernicious anæmia that differentiate it from secondary anæmias are the changes in the number and type of the red corpuscles and in the blast cells found in the blood. The blast cells are the mothers of the erythrocytes, and each blast cell thrown into the blood represents a permanent loss of blood-making power. Therefore, neither stimulation nor treatment can reproduce that which has been lost. The difficulty with the whole subject of pernicious anæmia concerns the fact that we do not recognize the disease until such vital and permanent changes as are indicated in the actual loss of these blast cells have taken place. It is even possible that pernicious anæmia, in its beginning, is not a definite entity, but that it is a terminal change of several conditions which we have not recognized until they have reached the final stage. Clinically, however, it is a very definite disease when both history and blood picture are developed. Pernicious anæmia may be called a cancer of the red cells, recognized in the hopeless stage. When the early histories of patients with pernicious anæmia are studied the symptomatology seems fairly clear; yet many patients are seen with anæmias which are suspected to be pernicious, but which never develop the true characteristics of the disease. If pernicious anæmia is to be cured it must be done before permanent damage to the hæmatopoietic organs has taken place. It is possible that certain types may be cured: yet so firmly fixed is our belief concerning the incurability of the disease that should we have patients cured by splenectomy, we would be inclined to lift them out of the category of pernicious anæmia and to group them with either hæmolytic icterus or splenic anæmia.

To sum up, splenectomy has a field of usefulness in selected cases of pernicious anæmia, especially in those showing a marked hæmolysis by the duodenal test and evidence of slight bone marrow damage. The operation of removal of the spleen for pernicious anæmia is not, as a rule, difficult. The spleen is only of moderate size, and not very adherent.

Leukæmia.

If there has been any one condition believed to be non-surgical and incurable, it is splenomyelogenous leukæmia. The theory has been that 95 per cent. at least of such patients operated on would die as a result of the operation, and that the 5 per cent.

who lived would not be benefited. Yet we have long known therapeutic agents (benzol, X-ray, &c.) which would reduce the size of the spleen and would also improve the condition of the blood; and as the size of the spleen became reduced such improvement might be expected. With the use of radium, which could be readily applied over the area of the spleen, a vast change came about in the therapeusis of splenomyelogenous leukæmia. I do not know of any clinical experience that is more striking than the result which follows the application of radium over a huge leukæmic spleen. Many times the spleen shrinks so greatly as to disappear below the left costal margin, the white blood corpuscles drop from hundreds of thousands to under 10,000. I have seen a leucopenia produced, the white cells dropping from 600,000 to 3,700 in five weeks. Accompanying this extraordinary reduction in the size of the spleen and reduction in the number of white cells an equally extraordinary improvement in the anæmia takes place, and the patient is marvellously benefited. As the spleen gradually increases again in size the white cells increase, the red cells decrease, and the patient loses ground. It is well to eliminate all of our presumptions concerning this disease and pause for a moment in perspective. Reduce the size of the leukæmic spleen, and synchronously the white cells go down, the red cells come up, and the patient improves. As the spleen enlarges the whites come up, the reds come down, and the patient goes down. Have we in this, as in so many other instances, allowed tradition to hamper progress?

My first experience in splenectomy for myelogenous leukæmia was with a patient who came to the clinic with a greatly enlarged spleen, a white count of between 200,000 and 300,000, and who gave a history of having had the disease for two years. There had been very great improvement under X-ray therapy; at one time the white cells were reduced by it to a point under 50,000, but, as regularly happens, the X-ray had finally lost its effect, and her condition when examined was worse than it had been at any former time. The patient herself was greatly impressed with the definite connection between the size of the spleen and her condition, and was anxious to have it removed. I removed the organ, and the patient made an excellent surgical recovery. Within ten days the white cell count had dropped to less than 50,000 and the patient is greatly improved now, more than one year following the splenectomy.

Based on this experience, we have in a number of instances reduced the size of the spleen with radium until the blood count approximated the normal, and then removed the spleen. We have found it inadvisable to force an extreme reduction of the leucocytes before splenectomy. If the general condition of the patient is good, a leucocyte count of 30,000 or less is satisfactory. All the patients, save two, have been markedly relieved. In the nineteen cases there were no operative deaths. That these patients are cured I cannot believe, but the experience has been interesting and suggestive.

Here again we find ourselves in difficulties not dissimilar to those in connection with the etiology and clinical course of pernicious anæmia. One patient in our earlier experience, I remember well, had been treated for leukæmia during a period of five months in a large and well-known hospital, and in another for three months. We diagnosed the condition as splenic anæmia. The spleen was removed, the patient promptly recovered, and has remained well now for more than five years. It is possible that we recognize leukæmia as a disease only after it has reached the hopeless stage, a terminal condition of a much more common though unrecognized malady. It is questionable whether all the cases of splenomyelogenous leukæmia advance to the point where they are recognized as leukæmia. These are interesting problems which cannot now be answered. Leukæmia may be called a cancer of the white blood, recognized in the hopeless stage. The leukæmic spleen is not adherent, as a rule, and after reduction in size by radium is readily removed.

Hæmolytic Icterus.

We have performed splenectomy nineteen times for hæmolytic icterus. The results have been astonishingly good. I do not know of an operation giving more gratifying results. The jaundice which the patient has had for perhaps years will be perceptibly less in forty-eight hours, and within four days will have quite disappeared. Sixty per cent. of these patients have complicating gallstones, apparently due to the greatly thickened bile, the result of pigments derived from the disintegrated erythrocytes. There are two types of hæmolytic icterus, the familial or congenital type and the acquired type of Hayem and Widal. In the familial type several members of the same family may be affected, and possibly it may be found through several generations. As a rule, it is less serious than the acquired variety. Although never robust, many times those affected with familial hæmolytic icterus will live out a normal life expectancy. The acquired type is much more serious, and ends, as a rule, in death from some intercurrent malady after years of chronic semi-invalidism.

The outstanding features of hæmolytic icterus are the enlarged spleen, more or less enlarged liver, and chronic recurring jaundice, without gross obstruction in the bile ducts. Bile is always to be found in the stool. Inasmuch as a high percentage of these patients have complicating gallstones, they may have an increase of jaundice due to a secondary infection from gallstones, varying the syndrome and introducing diagnostic difficulties. These patients all show marked anæmia, and usually crises more or less serious develop in which there is pain over the region of the liver and spleen, with malaise, some increase of temperature, and an increase of jaundice. Chauffard and Widal have pointed out the diagnostic phenomena or increased fragility of the erythrocyte, which is practically constant. Splenectomy, as a rule, is not difficult in these cases, for, although the spleen may be quite large, it is seldom adherent to a marked degree. There was but one operative death in our series. This patient was operated on during a crisis, and death probably would not have occurred had the operation been performed in the interval between crises.

BILIARY CIRRHOSIS.

Hæmolytic jaundice is often confused with certain types of non-infective biliary cirrhosis, and especially with the so-called Hanot's cirrhosis. We have removed the spleen four times for biliary cirrhosis, which could not be properly classified as hæmolytic jaundice. All the patients were above 30 years of age. Were it not for the age, the cases could be called Hanot's cirrhosis. The results in three were very satisfactory. The jaundice disappeared to a large extent, and the patients were able to return to work; but in all the liver remained large. The operation of splenectomy for biliary cirrhosis is somewhat troublesome and difficult, more so than in hæmolytic icterus. In our cases the spleen was large and there were many adhesions. In two the liver was sufficiently large to interfere mechanically with the operation.

SPLENIC ANÆMIA.

Osler was one of the first to describe splenic anæmia, and his classical contributions, coming as they did at an early time, created a great and lasting interest in the condition. Splenic anæmia is at least a clinical entity, but has been confused with many varieties of splenomegalias, syphilitic, septic, malarial, hæmolytic, jaundice, pernicious anæmia, &c. Little by little an irreducible minimum is being reached and a definite type established. The patients having large spleens develop a progressive anæmia and cirrhosis of the liver as a terminal condition to which Banti's name has been given.

The course of splenic anæmia is chronic. There may be intervals of years in which the patient enjoys a fair degree of health, but eventually it leads to a fatal issue, the debilitated patients succumbing to intercurrent disease.

Hæmorrhages from the stomach are of frequent occurrence in splenic anæmia, and sometimes hæmorrhage is the first symptom that may be noted. The hæmorrhages are probably gastro-toxic in origin, and while, as a rule, fatal hæmorrhage does not result, frequent, recurring hæmorrhages cause great debility. The gastric hæmorrhage of splenic anæmia is a symptom well worthy of attention. It is not different from that which occurs in connection with hepatic cirrhosis, and it is altogether probable that many of the unexplained hæmorrhages from the stomach in which no local lesion of the gastric mucosa is to be found, are a result of the toxic condition which precedes, accompanies, or is caused by splenic anæmia and cirrhosis of the liver. Balfour, in a paper on the causes of gastric hæmorrhage, calls special attention to the relationship of the spleen and liver to the bleeding. In gastric hæmorrhage we must think of the spleen and the liver as causative factors just as in the differentiation of the causes of jaundice the spleen must be thought of as well as the liver. Many cases of splenic anæmia show thrombosis of the splenic vein after death, and they believe that the thrombosis is the cause of the splenic condition. In one of our patients who died the cause of death was found to be due to long-standing splenic and portal thrombosis. The final catastrophe was brought about by thrombosis of the superior mesenteric vein. It may be contended that splenomegaly associated with splenic, portal, or mesenteric thrombosis (one or all) would be better grouped with infectious splenomegaly (probably streptococcal) rather than with true splenic anæmia.

The pseudoleukæmia of infants described by von Jaksch is closely associated, if not identical with, splenic anæmia, but because of the hæmatopoietic variability of infancy is often accompanied by a high white cell count. Such cases are usually to be relieved by dietetic management, but the spleen has been removed with prompt and striking improvement. Balfour splenectomized a two and a half year old child presenting the complete picture of splenic anæmia.

Splenic anæmia is cured by splenectomy in a high percentage of cases, and it should be performed before portal cirrhosis or thrombosis of the splenic vein occurs. The spleen is usually large and, as a rule, extremely adherent, and the operation is more difficult and dangerous than in any of the various other diseases for which splenectomy is indicated. In forty-three splenectomies for splenic anæmia we have lost four patients.

Clinically, patients with enlargements of the spleen are to be seen in whom the enlargement is apparently not producing symptoms, but these cases should be looked on as incipient splenic anæmia. Such causeless splenomegalias as I have had opportunity to observe have eventually led to marked secondary anæmia, although perhaps for years showing little effect on the patient's health. I have seen no good and much harm come from chronic splenomegalia, and other things being equal, such spleens should be removed on general principles.

PORTAL CIRRHOSIS.

The portal cirrhosis of the liver which so frequently accompanies the later stages of splenic anæmia have led us to remove the spleen in five cases of primary portal cirrhosis in which there was enlargement of the spleen. The results on the whole have been gratifying, although one patient died following the operation. The remaining four are in satisfactory condition. For those portal cirrhoses with enlarged spleen which occur especially in young adults without alcoholic history, splenectomy would appear to be indicated. As a matter of fact, in cases of this description do we not classify as primary portal cirrhosis those in which the liver condition is discovered first? If the splenic enlargement is first observed we call it splenic anæmia with portal cirrhosis.

Colonial Medical Reports.—No. 69.—British Guiana *(continued).*

The quarantine regulations have been duly enforced and no case of infection has occurred in this colony.

Forty-eight ships were visited by the Health Officer, and four ships fumigated by the Clayton machine.

The Quarantine Station has been inspected every three months and is kept in good order. The various disinfecting machines are regularly steamed and tried.

VACCINATION.

Glycerinated lymph is imported for the use of the public vaccinators, to whom it is supplied free of charge.

There were 3,889 successful vaccinations during the year.

BACTERIOLOGICAL DEPARTMENT.

The report of the Bacteriologist shows the varied but important work done during the year.

A large part of the work alone relates to assistance in diagnosis of diseases, such as tuberculosis, leprosy, and enteric fever.

Analysis of milk and water for public health purposes is an important feature. A large number of observations have been made on the efficacy of septic tanks in dealing with sewage and the production of satisfactory effluents.

BACTERIOLOGICAL DEPARTMENT.

The staff consists of a Bacteriologist, an Assistant Bacteriologist, a Clerical Assistant, two laboratory attendants, and a washer.

The Bacteriologist and Assistant Bacteriologist are also the Health Officers of the Port of Georgetown and, in addition, Medical Officers of Health to the Local Government Board.

The Bacteriologist was deputed by the Honourable the Surgeon-General to perform the duties of medical inspection of the estates and hospitals under the provisions of the Immigration Ordinance of 1891.

Special investigation has been made into the following subjects: Mosquito breeding-places around the Public Hospital, Georgetown; an investigation into dysentery at H.M.P. Settlement; on the nature of a disease amongst mules and horses in Berbice; dermal leishmaniasis; granuloma pudendi; the constitution of sewage and effluent in septic tanks.

The total number of bacteriological specimens examined was 2,777.

Thirteen specimens have been forwarded to experts for investigation and identification.

The number of *post-mortem* examinations made is 567. A large number of these were made by the medical officers of the Hospital. Ten were performed under instructions from the Coroner.

The specimens in the Pathological Museum have all been labelled. Twenty-three new specimens have been added.

The Röntgen ray apparatus has continued in satisfactory working order during the year. The apparatus was used 423 times for: Diagnosis of fracture, dislocation, &c., 17; Treatment, 406; total, 423.

Of the seventeen examinations made, ten were for the Public Hospital, five for private practitioners, and two for Government medical officers in the country districts.

MEDICAL OFFICER OF HEALTH.

PORT OF GEORGETOWN.

Forty-eight ships were visited. Quarantine was imposed for yellow fever against Trinidad from November 21, 1913, to January 17, 1914, and against Venezuela and Brazil during the whole year.

Quarantine was imposed for plague against Venezuela and Brazil during the whole year.

Quarantine was imposed for smallpox against Grenada from March 18, 1913, to May 5, 1913, and from March 14, 1914, to April 6, 1914; against St. Lucia from April 7, 1913, to April 24, 1913; and against Guadeloupe from March 2, 1914, to April 2, 1914.

Four ships were fumigated during the year, in each case the Clayton apparatus was used.

No persons were placed in the Quarantine Station during the year. The Quarantine Station has been inspected every three months and the various disinfecting machines steamed and tried.

PUBLIC HOSPITAL, GEORGETOWN.

The nurses and servants were drilled monthly in fire practice by one of the senior sergeants of the Fire Brigade.

During the year bathrooms and latrines were erected in the female wards. The kitchen was concreted and re-arranged, and a shed was built alongside of the kitchen for the storage of wood and coal.

Lamaha water is used for bathing and washing, and rain water stored in large tanks and vats for drinking, cooking, and medicinal purposes. The total storage capacity is 207,400 gallons.

The dietary is the official one of 1902 with modifications made during the years 1908-1909.

The conduct of the patients was, generally speaking, good.

The highest number of males in hospital on any one day was 289 on April 3, 1913, and of females the highest number was 210 on April 25, 1913.

The highest total number of patients in hospital on any one day was 487 on April 3, 1913.

The lowest number of males was 202 on March 14, 1914, and of females 139 on March 30, 1914.

The lowest total number was 350 on March 14, 1914.

As usual the death-rate of those who come to hospital too late for all human aid is high, as shown by the following table:—

Died within 12 hours of admission	86
,, ,, 24 ,, ,,	200
,, ,, 48 ,, ,,	281
,, ,, 72 ,, ,,	341

Table showing the number of deaths occurring within seventy-two hours of admission for the last five years:—

Years	Males	Females	Total	Percentage
1909-10	299	198	497	40·1
1910-11	339	187	526	30·02
1911-12	327	184	511	40·39
1912-13	245	67	412	35·6
1913-14	209	132	341	36·5

There remained in hospital on April 1, 1913, 285 males, and 188 females, giving a total of 473.

There were admitted during the year ending March 31, 1914, 5,193 males, and 4,237 females, a total of 9,430.

Of these admissions eighty-five were unallotted immigrants, thirty-five indentured immigrants from sugar estates, 567 free immigrants from sugar estates, and 1,674 free immigrants from places other than sugar estates. There were forty-six Chinese.

There died in hospital: Males, 553; females, 379; total, 932. This gives a percentage of 10·0 males, 8·5 females, and 9·88 on the total number of cases treated.

The out-door patients for the year were 9,619 males, 9,974 females, or a total of 19,593.

The chief diseases treated and number of deaths were:—

Malarial fevers	12
Phthisis	140
Pneumonia	77
Dysentery	50
Diarrhœa	4
Typhoid fever	58
Kidney disease	79
Ankylostomiasis	36
Diphtheria	3

[1] Of the cases of typhoid fever, 5 were notified as such, but died from other diseases.

There were admitted to the Tuberculosis Ward: Ninety-seven males, thirty-eight of whom died; seventy-four females, of whom forty died.

The death-rate from pneumonia for the year was 46·6.

There were 181 cases of typhoid fever, and fifty-eight deaths. Of these 181 cases, fifty-two were from country districts.

General Remarks.

In considering the various statistics with regard to the death-rate, deaths from operations, &c., it must be remembered that this is a general hospital in the widest sense of the term.

Every kind of case is admitted; it is a hospital for medical and surgical cases, for all kinds of tuberculosis, for maternity cases, for special diseases such as those of the eye, throat, ear and other specialities, as well as for many chronic incurable diseases which remain till death.

Of forty-six deaths connected with operative measures, twelve were maternity cases.

Of twenty-two deaths following delivery, no less than seventeen were due to eclampsia. This complication of the maternity cases is our bugbear. Latterly we have tried Cæsarean section, but with somewhat disappointing results. Delivery with forceps gives no better results. The reason why eclampsia is so disastrous a complication of these cases is the advanced state of kidney disease which is so prevalent in the colony.

During the last month of the year the number of beds in hospital was cut down to 400 by order of His Excellency the Governor, and instruction given to admit only hospital cases. This relieves us of that large number of hopeless and incurable cases which used to fill the hospital wards, and will effect a large saving in the hospital expenses during the coming financial year.

A. T. Ozzard,
Resident Surgeon.

Public Hospital, Georgetown.

Lectures.

The session started in April, 1913. Two hundred and eight lectures were given during the year and practical demonstration held in the wards in connection with the various classes. The attendance at the lectures continues to improve, and I am glad to say a marked interest is shown in the theoretical part of the work. Lectures were given as below:—

Senior Nurses in Third Year.—Surgical lectures: Dr. Craig; Medical nursing: Nurse-Superintendent; Pharmacy: Chief Dispenser.

Senior Nurses in Second-Year.—Medical lectures: Dr. Field; Surgical wardwork: Nurse-Superintendent.

Senior Probationers First Year.—Senior Divisional Nurse.

Junior Probationers First Year.—Junior Divisional Nurse.

Midwifery Lectures.

July to September, 1913.

Midwifery: Dr. MacQuaide, acting Assistant Resident Surgeon.

Pharmacy: Dr. Pereira.

General Nursing, Feeding and Care of Infants: Nurse Superintendent.

January to April, 1914.

Midwifery: Dr. Craigen, Assistant Resident Surgeon.

Pharmacy: Dr. MacQuaide.

General Nursing, Feeding and Care of Infants: Nurse-Superintendent.

Papers on medical and surgical nursing were given, and the oral examination was conducted as follows:—

Surgical Instruments: Dr. Ozzard, Resident Surgeon.

Drugs: Dr. Field.

Splints: Dr. Duncan.

General Nursing: Nurse-Superintendent.

Nineteen candidates entered and seventeen passed.

Two probationers' examinations were held:—

In September, 1913, by the Resident Surgeon and Nurse-Superintendent, when twenty-one entered and thirteen passed.

In February, 1914, when twenty-two entered, including two from Berbice, and twenty passed including one from Berbice.

Midwifery Examinations.

In April, 1913. By Dr. Ozzard, Resident Surgeon; Dr. MacQuaide, acting Assistant Resident Surgeon; Dr. Pereira, and the Nurse-Superintendent. Nine entered and seven passed.

In October, 1913. By Dr. Ozzard, Resident Surgeon; Dr. Craigen, Assistant Resident Surgeon; Dr. MacQuaide, and the Nurse-Superintendent, when five entered and two passed.

Seventeen nurses gained their certificates. Thirty-three probationers and nine midwives qualified for the year.

Changes in the Staff.

There are still forty-eight probationers who have entered on their training, and fifty-two left during the year. Five on trial and found unsuitable for training were given notice to go. Nineteen absconded, fifteen resigned on the grounds of health and various other reasons, two were dismissed for gross insubordination and neglect of duty, four were transferred, and seven left at the end of acting appointments.

It is impossible to realize the difficulty that is experienced in obtaining a suitable class of applicant, and even of those who are put on the list as eligible and taken on as vacancies occur, the result is often very disappointing; this is chiefly attributable to the motive for desiring to enter usually being to obtain employment of some kind rather than any special attraction towards the work.

The sickness rate for the year has been high, showing a daily average of 3·8; this with leaves and absences are constant daily factors in the reduction of the staff, and, seldom or never do we have our full complement on duty.

The out-door midwives' district work still continues to increase. Four hundred and seven applications were received during the year. Two hundred and fifty-nine cases have been delivered and attended in their own homes. Six thousand, two hundred and twenty-five visits have been paid by the out-door midwives. The work of supervision is continued by the Senior Divisional Nurse. During the year eight maternity bags have been lent out for the very poor.

Probationers' Home.

Eighteen probationers are still in residence under the immediate supervision of the matron.

Vacancies are readily filled and sought after, proving that the probationers appreciate the comforts of the home and realize the benefit it is to themselves.

Applications for work in all the branches continue to pour in, but only a few are found suitable.

PUBLIC HOSPITAL, NEW AMSTERDAM.

The grounds are in fair order. The exterior of the Hospital and out-buildings have been painted. The gates at the eastern and western ends of the Hospital have been closed down, and a new carriage gate has been erected at the northern side, near the gateman's lodge.

The pail system is employed, and the excreta is removed daily by the Town Council. A bathroom and lavatory are attached to each ward.

The water supply is of two kinds, viz.: Rainwater, for cooking and drinking purposes, stored in tanks; and creek water, for bathing and laundry work.

The dietary is in accordance with the authorized scale.

The number of beds is 150. The highest total number of patients in hospital on any one day was 151 on November 12, November 30, and December 4, and the lowest total number was ninety-four on August 20.

The conduct of the patients, speaking generally, has been good.

The number of patients remaining on April 1, 1913, was: Males, 66; females, 47; total, 113.

There were admitted during the year: Males, 1,319; females, 998; total, 2,317.

Thus there were treated in hospital during the year: Males, 1,385; females, 1,045; total, 2,430.

The number discharged was: Males, 1,166; females, 901; total, 2,067.

The number of deaths was: Males, 149; females, 105; total, 254.

There remained on March 31, 1914: Males, 70; females, 39; total, 109.

The condition of those discharged was: Cured, 1,076; relieved, 863; not relieved, 128.

The average daily number resident was: Males, 70; females, 49.

The percentage of deaths on the total number treated was: Males, 10·75; females, 10·04; total, 10·45. Of the deaths, twenty-one died within twelve hours, and fifteen within twenty-four hours of admission.

The average stay in hospital of patients discharged, died, and remaining on March 31 was:—

	Died	Discharged	Remaining
Males ...	15 days ...	10 days ...	44 days
Females ...	18 ,, ...	17 ,, ...	40 ,,

To the lunatic asylum were sent two males and two females. To the leper asylum were sent three males and one female. To the almshouse were sent twenty-seven males and eight females.

There were 116 births in hospital; of these eighteen were still-births.

The out-patients for the year were: Males, 7,793; females, 9,074; total, 16,867.

The last two years have been years of drought and remarkably healthy, and the numbers treated showed a remarkable diminution.

There were treated during the year fifty-seven police without a death.

J. H. Conyers,
Resident Surgeon.

Public Hospital, Suddie.

All the buildings require attention, this is more so the case in respect to the main one; here many repairs are very necessary. What is absolutely necessary is a hood running the whole length of the East, weather, side. The absence of this, which has been repeatedly asked for, causes much inconvenience, if not danger, to the patients. During heavy rains and strong winds, to which this hospital is exposed, both galleries and parts of the main wards are sometimes flooded, the result being that during such times all the patients are huddled together and the whole place is damp.

The pail system is used, and their contents are buried in trenches to the south side of the hospital.

The grounds around the buildings have been made up and graded towards the drains so that drainage is now more efficient.

The water supply, rain, is ample and good, and the iron tanks in which it is stored are rendered practically mosquito proof.

The conduct of the patients has been uniformly good.

The greatest number in hospital on any one day was seventy-four on April 10, 1913, and the least, thirteen, on November 17, 1913.

The chief diseases treated and the number of deaths were: Malarial fever, 3; enteric fever, 0; pneumonia, 15; dysentery, 3; ankylostomiasis, 7; diseases of kidneys, 15; yaws, 0; filariasis, 0.

Of the 105 deaths during the year forty-eight died within seventy-two hours of admission.

The total number treated in hospital during the year has been 795 patients, and the number of deaths 105, giving a mortality of 13·20 per cent.

There were eighteen births in hospital of which four were still-born.

The out-patients treated were 3,813.

C. F. Castor.

Bartica Hospital.

Extensive repairs were done to the steward's quarters. The central block roof of the Hospital was renewed with corrugated galvanized iron. Minor repairs were done to other parts of this building.

Drainage and sanitary arrangements were good. The water supply has been abundant and good. Dietary, good.

Accommodation: Male ward, 24; female ward, 11.

Statistics.—The greatest number of patients in hospital on any one day was fourteen, on December 13, 1913, and the smallest number was one, on March 19, 1914.

The number of patients in hospital on April 1, 1913, was four males and four females.

The number of patients admitted during the year was 197 males and ninety-six females.

Patients discharged during the year numbered 171 males and eighty-five females.

Died during the year, sixteen males and seven females.

Patients remaining on March 31, 1914, five males and three females.

Of those who died:—

2 died within 12 hours of admission.
3 ,, ,, 24 ,, ,,
1 ,, ,, 48 ,, ,,
1 ,, ,, 72 ,, ,,

The death-rate on the total treated was 7·8.

There were nine births in hospital during the year.

The number of out-patients treated during the year was 380 males and 349 females.

The chief diseases treated and number of deaths were: Malarial fever, 2; phthisis, 0; marasmus, 1; dysentery, 8; convulsions, 2; myiasis, 1; ankylostomiasis, 0; pneumonia, 8; typhoid, 1; other diseases, 0. A total of 293 cases with twenty-three deaths.

A. C. L. La Frenais,
Resident Surgeon.

Public Hospital, Morawhanna.

The accommodation at the Morawhanna Hospital remains the same as in the previous year, namely, for fourteen male and eleven female patients. At the Arakaka Dispensary also the accommodation has been the same as in the previous year, namely, for twelve patients.

The total number of admissions during the year under review was 320 males and 133 females.

From the previous year there remained in hospital five males and three females.

The number of deaths during the year under review was twenty-one males and fifteen females.

The chief diseases treated during the same period were: Malarial fever, pneumonia, heart disease, and ankylostomiasis.

The death-rate on the total number treated was: Males, 6·4; females, 11.

Of those that died within twelve hours of admission, four males, one female; within twenty-four hours of admission, one male, one female; within forty-eight hours of admission, one male, one female; within seventy-two hours of admission, two males, two females.

During the year under review the nursing of the patients was on the whole satisfactory.

There were seventeen cases of confinement.

There were 3,203 cases treated as out-door patients during the year.

The daily average number of in-patients treated during the year: 10·12 males; 37 females; total 10·49.

The building is in good condition, some minor repairs were carried out during the year under review, and the outside painted.

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Hospital Compound, Morawhanna.—This has been kept in good order and condition during the year.

The Village of Morawhanna.—The streets have been kept in fairly satisfactory condition. The drainage also is fairly satisfactory. The health of the inhabitants has been good.

The system of sewage consists of closets and trenches that are tide-flushed. The pail system is confined to the Government reserve.

The burial ground is in good condition.

Arakaka Dispensary.—The building and quarters are in good condition. The compound has been kept clean and is also in good condition. The district: Regular visits have been made during the year. The health of the people was fairly satisfactory. The burial ground has been kept clean and in good condition.

Malarial fever was prevalent during the year.

Quinine has been regularly supplied to St. Bede's Mission; also other medicines were supplied free to the Mission, to be distributed amongst the sick in this portion of the district.

Quinine has been regularly and systematically supplied to every police station in this district.

C. H. Downer,
Acting Resident Surgeon.

Public Lunatic Asylum, Berbice.

The usual numerous repairs to the buildings were carried out by our staff of artisans. The buildings, with the exception of the administrative block, are in good order.

The grounds have been kept in fair order, and constant attention is given to them and to the earth drains to keep them free from grass. The roads require relaying with burnt earth, the supply of which hitherto has been insufficient.

A new carpenter's shop was made under the tailor shop block, doing away with the unsightly shed previously used as such. I regret that owing to want of funds it has not been possible to convert the old No. 10 Block into a smithy and storeroom, thus doing away with the sheds used at present as smithy and carpenter's stores which do not enhance the appearance of the grounds.

Sanitary Arrangements and Drainage.—The quarters of the Medical Superintendent and Medical Officers were provided with water closets, and septic tanks were built to receive the discharges therefrom. It is contemplated to provide the Steward's quarters with a similar convenience.

The removal of excreta from the blocks is still being done in the same primitive and unsatisfactory way, which could be improved upon by providing large septic tanks, but owing to the distance between the blocks, each would require a special tank.

A new set of latrines was erected in a central position in the grounds for use of the subordinate officers and patients working in the kitchen.

Water Supply and Dietary.—The rain water in the tanks and vats attached to the buildings and the creek water from the Water Works have proved sufficient for the actual needs of this Institution in spite of the long drought; two or three of the tanks which became empty were filled with creek water which was treated with alum and chlorinated lime, thus providing good wholesome drinking water.

The dietary of the attendants and patients did not suffer for want of ground provisions as in the previous year; these were obtainable during the past year, and the result is the much reduced mortality amongst the patients, viz., thirty-nine, as compared with 136 in 1912-1913.

Regular monthly fire drills were held during the year by Sub-Inspector Irving, and after his departure from the county, by the Sergeant-Major of Police. Our thanks are due to these officers for their kind services.

Inquests.—There was none held during the year under review.

The number of those admitted was: Males, eighty-one; females, fifty-seven.

The occupations of those admitted were: Beggar, 1; barman, 1; labourers, 81; gold digger, 1; clerkesses, 2; bookkeeper, 1; engineers, 2; blacksmith, 1; balata bleeder, 1; convicts, 6; painters, 2; sailmaker, 1; unknown, 6; domestics, 25; midwife, 1; school teacher, 1; vagrant, 1; bakers, 2; shopkeepers, 2; total, 138.

The chief diseases treated were: Chronic Bright's disease, senile decay, colitis, lobar pneumonia, pulmonary tuberculosis, besides the usual forms of insanity.

During the year three cases of pellagra were admitted and one of these ran a very rapid course, ending in death within six weeks of admission; about eight cases of chronic pellagra have been found amongst patients who had been in this Institution many years; one of these (an East Indian woman) made a very good recovery from the pellagrous attack and accompanying insanity, and was discharged as "recovered."

The number of patients employed in various occupations was 751.

Two male and two female patients made their escape from the blocks in which they were confined; only one of these succeeded in going some distance from the asylum boundaries and was brought back about two hours afterwards.

There were two attempts at escape, but the patients had not left the asylum boundaries when caught.

Casualties.—There were 232; eight major injuries included one fracture of a clavicle and one fracture of both bones of the forearm of an elderly female patient; both were inflicted by fellow patients. The remainder of the casualties were due to small bites and to contusions sustained by falls due to epileptic seizures.

Q. B. de Freitas, G.M.O.,
Medical Superintendent.

Public Leper Asylum, Mahaica, E.C., Demerara.

Sanitary Arrangements and Drainage.

The pail system is in use and the excreta is buried. The drainage continues satisfactory. The concreting of drains is still being pushed on; no outside labour is supplied. The main trenches have been kept clean and are flushed daily at high tide. It is hoped that the open sullage trench from the kitchen that has for years been recommended to be concreted, will receive early attention.

A new reinforced concrete cistern to hold 10,000 gallons has been erected. This is the first of the three cisterns recommended, the capacity is equal to about three of the ordinary vats. Cisterns of the kind will be a great saving, as the initial cost is less than vats to hold the same quantity of water and the repairs will not be almost an annual one.

The rain falling on the roofs of the larger buildings and cottages is conducted into large tanks and vats for drinking and cooking purposes. The total storage is 140,874 gallons.

Water for laundry and sanitary purposes is supplied by a shallow well in the male compound. The male bathroom is supplied by water pumped from the Mahaica Creek. For the female bathroom rainwater is used, except in very dry weather.

The dietary was of good quality and ample, the cooked food was daily inspected at each meal.

Fire practices have been held during the year. Attendants and inmates attended the practices, and the brigade still continues to be under charge of an ex-policeman inmate.

The male Asylum accommodation was ample. All doubtful male cases have been accommodated in a separate temporary cottage in the north block. The female Asylum accommodation was limited and barely sufficient to house the women inmates.

Separate isolation cottages for males and females respectively should be erected in the Asylum and so fenced off that there would be no communication with leprous inmates of the general Asylum. Though a cottage has been temporarily set apart for doubtful male admissions, yet isolation was not complete, these doubtful or would-be isolation cases move freely about with lepers all day and until bedtime.

There has been a slight decrease in absconding. Number of absconders, 1912-13, eighteen males; 1913-14, fifteen males, one female—sixteen. Of those absconded during the year, returned voluntarily, two males; recaptured by the police, seven males; still at large, six males, one female. Despite the means adopted to prevent male night intruders to the female cottages, breaches of the Regulations have occurred in this direction, though it must be remarked not to the same extent as formerly.

The general conduct has been very satisfactory, there can be no doubt as to the increased improvement. It is pleasing to record that the conduct of some of the male and female inmates still continues to have a salutary effect on the others.

Religious Services, School, Amusements.

Another Sect, the Seventh Day Adventists, has been established and added to the religious life of the Asylum during the year.

Religious services have been regularly held as follows: Every Sunday at 8 a.m.; every alternate Thursday at 7 a.m.; the Seventh Day Adventists every alternate Saturday morning.

Every Sunday, from 12 noon to 1.30 p.m., a Sunday School has been conducted by the inmates. Daily Services at noon have been encouraged and carried on by some of the male inmates. Lay preachers have also from time to time addressed large gatherings of inmates, amongst whom the name of Dr. Anderson, M.D., B.A., B.S.C., Lecturer, of Highbury, London, must be recorded, for his visit and address of encouragement to our inmates.

School has been regularly conducted. The boys are under charge of inmate Goring, and the girls are taught by inmate Diana Thomas.

Amusements.—A new pavilion, measuring 35 ft. by 12 ft., has been erected on the recreation ground for the use of the inmates. We are very thankful to report that the Committee of the Missions to Lepers in the East and India have kindly made us a grant of £10, and with that amount, at our request, they purchased a large number of interesting magic-lantern slides of secular and religious views. Concerts and variety entertainments by inmates, magic-lantern exhibitions, dancing, cricket, athletic sports, &c., have been the principal pastime during the year. We have still in good order and in use a gramophone, music box, and magic lantern.

Industrial Occupation.

Male and female inmates, who are able to, have been employed in all the various works of the Institution and have performed their varied duties with entire satisfaction. Needles to say, the labour value is of very material assistance to the general upkeep of the Asylum, and the health, too, of the inmates benefits largely by daily occupation in the open.

General Remarks.

In the last annual report of the Asylum it was shown that of the four nastin discharged cases of 1910 one could not be traced. Three have been readmitted; of these, one died from his leprosy, and there remained two: E. L., male, aged 36, and W. C., female, aged 16. Both of them are of the nodular variety. E. L.'s condition is far advanced, more leprous infiltration, increasing nodules and ulcerations. In the case of W. C., shortly after readmission such clinical signs as leprous infiltration and thickening of fingers, hands, upper eyelids, also of nose, lips, feet and toes, disappeared without any treatment; this is not, however, exceptional, and must be regarded as due to the situation of the Asylum, good food, proper hygienic surroundings, and regular habits. The girl so far improved that, with the exception of a small nodule on one *ala nasi*, there were no other clinical signs of leprosy. It may be mentioned that nodule on microscopic examination showed the presence of large numbers of Hansen's bacilli. It might be of interest to note that along with others this girl, W. C., was selected for a course of Chaulmoogra oil. She began treatment on January 2 last, starting with 3-minim doses of the oil three times a day along with a nightly inunction of Chaulmoogra oil; she took the treatment for thirteen days, and during that period, along with others, she suffered from malaise, slight gastric disturbance, &c.—the usual sequelæ of Chaulmoogra oil; but in addition there was strong general reaction, and she was admitted to hospital on January 21 last with rise of temperature, 102°, rheumatoid-like pains all over the body, all the fingers glossy, infiltrated, and swollen. She passed through the typical stages of a subacute exacerbation of leprosy. The explanation in this instance might be that Chaulmoogra oil is capable of producing antibodies in the living organism; *en passant*, it may be here stated that it has been demonstrated in vitro through the means of the complement fixation test, that the sera of lepers that have been treated with Chaulmoogra oil have in instances given a marked positive reaction with emulsion of Chaulmoogra oil 1 : 1,500. To return to W. C.'s case, since the reaction the nodule has gradually shrivelled and is fast disappearing.

No special new treatments were carried out during the year.

There were twenty-seven male and twelve female nodular cases, and six male and five female anæsthetic cases, ages from 10 to 58 years, selected for treatment by Chaulmoogra oil, both internally and externally, but the constitutional disturbances in nearly all the cases were so marked that the treatment had to be abandoned.

In view of the favourable conclusions recently recorded by Dr. Bayon of the treatment of leprosy by Chaulmoogra oil and Anti-leprol in the Robben Asylums, South Africa, and the little experience I have obtained at this Asylum with the first named medicant, it is hoped that during the present financial year regular and continuous treatment will be carried out with the two named articles.

The fall in the number of trophic ulcers has been steady and only about 31 per cent. of the total inmates now suffer, and extensive ulcerations are comparatively few. It was almost the exception for the leper to be without an ulcer. It is pleasing that this added discomfort to the lives of our inmates has been so far reduced, and it is only a small proof of what attention and care can accomplish. All ulcers are attended in hospital or at the dressing stations. When the order was first made there was a deal of opposition by inmates. Now that the results are so beneficial on the slightest appearance of an ulcer the inmate will at once go off to either place to be dressed. It is almost surprising how readily ulcers of all sizes heal, and only in the last stages of the leprous condition that healing is retarded. In the majority of cases ac. carbolic lotion 1 : 40 acts almost as a charm.

There have been two births of leper parents during the year. The infants were examined at birth, found to be healthy, and were removed immediately after delivery from their mothers. One child was weakly and lived for a day, the other was sent to the Orphan Asylum and has since died.

The causes of death have been during the year as follows:—

DUE TO LEPROSY.		
Chronic leprotic infiltration ...	6 cases	Total 26 or 65 per cent.
Acute leprosy	1 case	
General debility	3 cases	
Chronic ulceration	6 ,,	
Muco enteritis...	10 ,,	
DUE TO OTHER CAUSES.		
Heart disease	6 cases	Total 14 or 35 per cent.
Bright's disease	2 ,,	
Bronchitis (asthmatic)	2 ,,	
Malarial intermittent fever ...	1 case	
Paralysis	1 ,,	
Diarrhœa	1 ,,	
Pulmonary tuberculosis	1 ,,	
Infantile debility	1 ,,	
Grand total ...	40 or 100 per cent.	

It will be seen that leprosy is itself responsible for almost double the number of deaths of other affections.

The death-rate has been exceptional and perhaps the lowest on record for the Asylum.

FRED T. WILLS,
Medical Superintendent.

SKELDON MEDICAL DISTRICT.

The sanitary condition on the sugar estates was generally fairly good. Drainage, yards and ranges were kept in fairly good order. Sufficient latrines are present and were kept clean.

The water supply in ponds was sufficient and well protected from fouling by barbed-wire fence and small dams.

The general health was remarkably good. No epidemic of any sort took place.

The majority of cases treated in hospitals were, as the previous year, fever free; skin diseases, such as small ulcers, chiggoes, scabies and other pustules.

Quinine distribution to labourers not patients in hospital and to children on the estates is regularly carried out.

On Plantation Skeldon the total number of patients treated in hospital was 955. Of these, fifty-three only were malarial fever and fifty-nine ankylostomiasis.

During the year seven deaths took place in hospitals from the following causes: Meningitis, 1; congenital defective heart, 1; bronchitis, 2; gastric ulcers, 1; chronic diarrhœa (pellagra), 1; acute nephritis, 1.

Sixty-three births took place, and there were six deaths of children under 1 year of age for the whole estate *cum annexis*.

The population is calculated to be 2,082.

Plantation Springlands.—The population is 573.

In hospital were treated during the year 156 cases, of which ten were malarial fever and seven ankylostomiasis.

The number of deaths being six, from the following causes: Malarial fever, 1; dysentery, 1; cerebral hæmorrhage, 1; senile debility, 1; and Bright's disease (nephritis), 2.

Thirty-four births took place, and four deaths of children under 1 year of age, of which two were premature births and died within a few hours after birth.

The Villages.—Sanitary condition, drainage, &c., were exactly as reported last year.

The weather during the year having been very dry again, general health was by no means bad.

E. H. Gewand,
G.M.O.

Port Mourant, Berbice.

Estates and Villages.

The general health has been good, particularly so in the last three months. There have been no epidemics. It has been a very dry year.

The prevailing diseases have been bronchial and intestinal affections. Malarial fever has shown an increase on the estates, but in the villages I think it has been less. Typhoid and paratyphoid have been less than for some years.

Mortality has been less, affections of the respiratory and gastro-intestinal systems causing most deaths.

I am glad to say that owing to some of the cattle farmers supplying milk to the villages it is easier obtained than previously.

Estates.

Both hospitals show a diminution in the number of admissions and deaths, the small number of new coolies allotted helping this. There was only one ship allotment made (ex Dewa to Port Mourant), these people were a much better lot than usual.

Skin diseases have again made a large number of admissions and, as usual, they are mostly cases of small ulcers and eczema of a parasitical origin among the more recently arrived immigrants.

Ankylostomiasis is not marked, cases come mostly from the settlements or places outside of the yard proper; a few severe cases have been treated. A.D. infection is, I think, less, but although from the figures there appears a decided improvement, there have been a good many cases treated who have been admitted for other diseases.

At Port Mourant there have been no cases of typhoid or paratyphoid during the year. At Albion five cases with three deaths have occurred.

Dysentery, which years ago was frequent on these estates, now is rare, and the intestinal cases, with the exception of infants, when the cause is probably improper feeding, are less severe than formerly.

At Albion Hospital 1,879 cases were admitted with thirty deaths, as compared with 2,453 cases with forty-one deaths last year.

At Port Mourant Hospital 1,569 cases were admitted with nineteen deaths; last year 1,700 cases with thirty-four deaths.

The rainfall was 46·74; the highest month, December, with 14·17 in.

With regard to malarial fever, although there is a rise on both estates as compared with last year, there has been no very marked rise in any one month considering the population.

At Albion, with 262 cases, the highest rate per month was forty-three in September, thirty-six in October, thirty-four in November, and thirty-two in December.

At Port Mourant, with 168 cases, November had forty-three, December fifty-three, and January twenty.

Both of these estates have irrigation, and the rice-cutting was between September and December.

Sanitary Conditions and Drainage.—At Port Mourant the indenture yard has good latrines and the yard is kept in good order. At Albion the indenture yard latrines can be improved, and with this the sanitary condition would be improved, as otherwise the yard is kept in fair condition. The drainage is good.

Latrines for the free yards and settlements should be seriously considered. At Port Mourant there are in one place a few, at Albion only for the estate yard, which are far from perfect.

The ranges are in good order.

Water supply from the Canje Creek and stored in ponds; there has been a good supply.

Villages.

Show little change. Steps are, I believe, in process of being taken to prevent the flooding of the house lots at Letter Kenny.

Statistics.

In dealing with the birth- and death-rates of the estates and villages of this district, which extends from Seawell to No. 36, I have taken the population of the villages and outside the estates as estimated in the recent census, and the population of the estates as given me by their yearly estimation, the years ending in December.

Year	Birth-rate per 1,000 of population	Death-rate per 1,000 of population	Children under year per 1,000 births
1909-12	36·77	17·60	
1913	33·50	14·52	124·54

Against the death-rate must be added those deaths occurring outside the district, as in the Public Hospital or in the bush, probably not many, but which I am unable to estimate.

These comparatively favourable figures are no doubt due a good deal to the scattered population, Rose Hall Village, with a population of about 2,000, being by a long way the most densely populated place, and also to the comparatively little amount of malarial fever about.

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With regard to the estates, Albion shows:—

1909-12	35·27	15·76	137·82
1913	36·03	11·40	129·49

Port Mourant:—

1909-12	31·01	14·40	160-59
1913	23·68	12·60	196·72

In comparing the rate on the estates the population of Albion has remained much about the same with slight variations in 1909, 3,701; in 1913, 3,857.

Port Mourant shows a gradual rise from 4,332 in 1909, to 5,151 in 1913.

I consider to a great extent the difference in the birth-rate between the two estates, and also probably to a lesser extent in the death-rate of infants is due to the inferior lot of indentured women sent to Port Mourant as compared with those sent to Albion; I have known these estates off and on for a good many years and that has always been my impression.

Year	Birth-rate per 1,000 indentured women at Albion	Birth-rate per 1,000 indentured women at Port Mourant
1904-08	—	86·79
1909-12	174·96	45·60
1913	108·57	66·66

Albion has had a good deal more indentured women than Port Mourant. At Port Mourant most of the women do not leave the estate after the period of indenture is completed, and this must affect the general rate of fertility among the free people there.

As the death-rate among infants at Port Mourant is regrettably excessive I started, with the cooperation of the Manager, in January the monthly inspection of, as far as possible, all free as well as indentured pregnant women and infants.

C. P. KENNARD.

CANJE-HIGHBURY DISTRICT.

The general health of the district has improved immensely of late years. How far this is due to the succession of dry years and how far to work done against such diseases as malarial fever and ankylostomiasis time alone can prove.

The chief diseases have been ankylostomiasis, pneumonia, bronchitis, and malarial fever.

The mortality has not been excessive.

Sanitation (excluding sun, wind, and rain) is still non-existent outside the sugar estates.

The water supply is still unscreened barrels, supplemented by ponds, trenches, and rivers.

I have done little vaccination on account of the uselessness of the Government lymph. What I have done has been with lymph imported by myself. I believe the trouble has now been overcome, and expect to do a large number of successful vaccinations during next year.

WALTER S. BARNES, M.D.

MARA.

Malarial fever was rife, 265 cases were treated with three deaths.

Pneumonia was fairly common, twenty-five cases being treated with six deaths.

For the whole year there was a total of 750 cases treated with twenty-three deaths.

A. C. L. LA FRENAIS.

CHATEAU MARGOT, EAST COAST, DEMERARA.

The general health on the estates and in the villages was good. There were no epidemics.

On the two sugar estates there was a great decrease in the number of cases of malarial fever.

On Plantation Bath there was a great rise in the birth-rate, and a slight one on Plantation Blairmont.

The prevailing diseases were malarial fever, intestinal and respiratory affections, ankylostome infection, ulcers, and parasitic skin ailments.

There were 5,466 examinations made for the detection of ankylostome infection.

The mortality on Plantation Bath was higher than during the year before last, and on Plantation Blairmont slightly so.

There were no deaths amongst the indentured immigrants on Plantation Bath.

In the villages the mortality, so far as known to me, was not above the average.

The sanitary condition remained practically unchanged, and in the larger villages leaves much to be desired.

The water supply was the same as previously, and in the case of the villages entirely unprotected from fouling.

Vaccination was kept up.

I. K. REID.

MAHAICONY.

The general health of the people has been good. The prevailing disease has been malarial fever, but the type of fever was, as a rule, mild, and in the case of young children seldom accompanied by convulsions.

Sanitation is bad.

The water supply is chiefly from creeks, ponds, and trenches. The quality of the water is usually bad. In dry weather water is both scarce and bad.

P. MACADAM.

MAHAICA, EAST COAST.

During the year the western boundary of the district was extended to Belfield, and now includes Plantation Hope, Ann's Grove, and neighbouring villages.

The health of the residents in the villages and on the estates (Plantation Cane Grove and Hope) was good, and did not materially suffer from the prolonged drought which was experienced.

The sanitary arrangements in the villages are primitive; the drainage generally is good, but the trenches in and around Tranquillity Hall remain in the same neglected condition as mentioned by me in my report of last year.

The chief diseases treated were those of the intestinal and respiratory tracts.

M. H. C. Irving.

Buxton, East Coast.

On January 1, 1914, the district was rearranged. Plantations Non Pareil, Enmore and Cove and John added with villages from Buxton to Victoria included; while Plantations Mon Repos, La Bonne Intention with Beterverwagting Village were taken off.

The Estates.

The general health has been very good, thanks again to a dry year. Plantations Lusignan and Non Pareil will compare very favourably with any other estate in the colony as to birth- and death-rates.

Prevailing diseases: Ankylostomiasis, influenza, and fevers (typhoid and paratyphoid included).

Sanitary condition, good.

Mortality. Birth-rate again in excess of death-rate, especially at Lusignan and Non Pareil.

The Villages.

The general health, good.

Prevailing diseases: Fevers, ankylostomiasis, which is very rife, and bowel complaints.

Sanitary Condition. I regret that my remarks about pigs and carrion crows and ducks being the principal sanitary officers still hold good.

W. J. von Winckler.

Chateau Margot.

The Estates.

The general health of the inhabitants of the estates has been good.

The prevailing diseases were bronchial affections and parasitic diseases of the skin.

The sanitary condition was good.

The Villages.

The general health of the inhabitants of the villages has been good.

The prevailing diseases were malarial fever, dysentery, and Bright's disease.

The sanitary condition of the villages is not good.

R. Carter.

River View, East Bank, Demerara.

Estates.

I give the birth-rate and mortality on the Diamond Estates for the year: 1913-1914, birth-rate, 43·3; death-rate, 16·5.

The high level of the birth-rate and the lowness of the mortality for 1913-1914 are attributable in large part to favourable atmospheric influences, the year having been a dry one following two very dry years. The preventive use of quinine by the entire East Indian population of these estates, and the progress of the work for ridding them of ankylostomes, contributed also to these satisfactory results.

The action of quinine has been found most beneficial in reducing the percentage of enlarged spleens among the children 12 years old and under on the Diamond Estates.

The number of cases of malarial fever was much less than it used to be apart from the healthy action of the dryness of the atmosphere during the past three years, referred to above; this is attributable to the general use of quinine. This district is intensely malarial; and in wet and humid years malarial fever may be expected to prevail extensively, unless it is kept in check by the controlling action of quinine.

Ankylostomiasis.—Much good work which has been done to eradicate the ankylostomiasis from these estates up to the end of the past financial year.

Of the 3,369 persons found infected at the first ankylostome survey, 901 were still uncured and undergoing treatment at the end of March, 1914.

Since that date a second survey of all the coolies in the estate yards has been in progress and is nearing completion.

The figures for the south yard at Diamond, Farm, and Herstelling are now available. They show that of those who were found free of ova at the first survey 11·0 per cent. are now infected. Of those who were treated and cured, 12·0 per cent. are now re-infected.

The whole East Indian population of those yards, including new-comers since the first survey, is at present infected to the extent of 13·7 per cent. At the first survey the percentage of infection was 61·2.

As I stated in the previous report, the chief sources of re-infection of the estate coolies are to be found, not in the estate yards, but in the neighbouring villages, the cane-fields near them, and other localities that are soiled by infected villagers. The second survey showed that very few fresh infections occurred among the young children, who usually do not frequent those localities.

This considerable percentage of re-infections from soil contaminated by infected villagers gives point to the desirability of eradication work among the villagers of the district. Fortunately, a campaign has recently been started by the Rockefeller Sanitary Commission to eradicate the disease from the entire village population of this district.

The infant mortality for the past year was 123 per 1,000 births. This figure is fairly satisfactory, considering the large proportion of coolie infants who are born either immature, or puny and asthenic at term.

The principal causes of immaturity and asthenia in these infants are the weakening effects of malaria and ankylostomiasis on the mothers. The latter of these causes is being rapidly removed by the extermination of the ankylostomes; and the general use of quinine is gradually diminishing this effect of the former.

Years must elapse, however, before the full benefit of these measures is reaped, and the number of immature and asthenic births is reduced to a minimum, for many of the women have suffered much from these diseases, and in numerous cases their internal organs remain in a damaged condition for a long time, sometimes permanently, after these causes are removed.

It is exceedingly difficult to restore to normal tone and vigour the blood-forming function when it has been overtaxed for years by ankylostomiasis. It is equally difficult to restore to healthy size and function spleens which have been greatly enlarged by oft-repeated attacks of malarial fever, and practically impossible to do so when they have become fibrous and indurated.

The kidneys, too, are damaged by malarial fever, in some cases permanently. Transient albuminuria is common in malarial patients in this district, and confirmed Bright's only too frequent. Some years ago I had the urines of the young children in the Peter's Hall yard tested, and found about 10 per cent. of them more or less albuminous.

It may be expected, however, that the systematic use of quinine will prevent not only malarial attacks, but also these resulting disorders in the spleen and kidneys; and that, with ankylostomiasis abolished, the mothers will bear more easily the strain of pregnancy, and bring forth the largest possible proportion of fully developed and vigorous infants.

Typhoid Fever.—From January, 1911, to January, 1914, inclusive, 179 cases of enteric fever occurred among the coolies in the yards of the Diamond Estates and were treated in hospital. The case mortality was slightly over 8 per cent.

Male	Female	Total	Percentage
83·0	66·0	149	83·2
15·0	15·0	30	16·7
98·0	81·0	179	—
54·7	45·2	—	100·0

It may be mentioned that the great majority of enteric fever cases are creoles; and among them there is a negligible preponderance of male cases.

The immigrants are in a small minority.

This is the more remarkable that they form the larger part of the population of the estates. In their case the figures for the sexes are equal.

The infants and children under 10 years account for nearly half the total number of cases; and they are all creoles. In the next decade, which accounts for 20 per cent. more of the total, only one is an immigrant. It is only in the third and fourth decades that the immigrants appear in any considerable number, whilst the number of creoles rapidly diminishes.

Clearly, on these estates typhoid fever selects its victims chiefly among the creole coolies, and especially among creole children.

Noteworthy is the comparative freedom of the immigrants from the disease. In the general population of these estates the adult immigrants—the immigrants are mostly adults—greatly outnumber the adult creoles; and yet the number of cases among them was exactly equal to that supplied by the creole adults, and therefore disproportionately small.

There is no ground for supposing that in early life the immigrants suffer in India from the disease in larger proportion than do creoles here. If these immigrants are not immune when they leave India, their relative freedom from attack here is not sufficiently explained by the comparative absence among them of children and adolescents, who supply the bulk of the creole cases. On these estates there are large numbers of immigrants in the first decade of adult life, a period particularly prone to typhoid infection.

The creoles and immigrants live together in the same yards, and on the closest terms of social intercourse and intimacy.

What can be the mode of infection which causes the creole coolies to supply 83 per cent. of the cases and the immigrants only 16 per cent.

This class distribution of the disease is not explained by water conveyance of the bacillus; for creoles and immigrants use the same water. Neither does the theory of dissemination by flies throw any light on the problem. Personal contact as a mode of transmission of the disease leaves the difficulty unsolved.

Whilst making inquiries on the subject my attention was directed to the probability of the germs of typhoid fever being spread among the coolies chiefly by milk.

Speaking generally, these estate coolies may be divided into those who habitually drink milk and those who do so only occasionally. The former class consists chiefly of creoles, the latter of immigrants. The immigrants are accustomed to take a full meal of rice and other solid food in the morning before going to work. But the creole coolies, like other natives of the colony, take a light morning meal, of which milk is an essential part. The quantity of milk used is, as a rule, a quarter of a pint.

This quantity is so small that, as often as not, the trouble of boiling it is dispensed with, and the milk is taken unsterilized.

The trench water commonly used by the milkmen for washing their cans—and sometimes added to the milk—is liable to contamination from typhoid cases.

If on the estates the disease is conveyed chiefly by milk, the difference may be accounted for, in view of the different habits of creoles and immigrants in regard to the use of milk.

This mode of conveyance would also explain an observation to which I made reference in a previous report—namely, that cases of typhoid fever on these estates diminish with the long continuance of heavy rains, and increase in prolonged dry weather. Months of heavy rains would tend to flush out of the trenches the germs which would accumulate in the dry season. During the past three exceptionally dry years typhoid fever has assumed epidemic proportions previously unknown.

Villages.

The villages continue to be in a much worse condition than the estates as regards birth-rate, death-rate, and infantile mortality.

The following figures show the birth- and death-rates in the villages: La Penitence, Agricola, Bagotstown, Golden Grove, and Craig:—

Year	Birth-rate per 1,000 of population	Death-rate per 1,000 of population
1913	28·1	27·0
1912	24·3	25·6
1911	21·8	29·3
1910	21·1	32·4
1909	23 1	34·0
Average of the five years	23·5	29·6

We now show the infantile mortality in the villages: La Penitence, Agricola, Bagotstown, Golden Grove, and Craig:—

Year	Mortality per 1,000 births
1913	232
1912	158
1911	338
1910	285
1909	354
Average of the five years	270

In both these tables the figures are discouraging, and strikingly reflect on calamitous sufferings of the people.

In a previous report I pointed out that quinine as a preventive of malaria is seldom used by the villagers, and that no attempt had been made to deal with their extensive ankylostome infection. Above I have referred to the campaign for the eradication of the hook-worm from the entire village population of the district. This campaign was started in the beginning of April, 1914, and is making rapid progress.

Judging from the results obtained on the sugar estates, there is every reason to anticipate great improvement in the health of the villagers as a result of this important work.

If these people could also be protected against malaria by quinine, like the coolies on the sugar estates, the vital statistics of the villages would, in a few years, indicate a notable and much-to-be-desired increase of population.

J. E. A. Ferguson, G.M.O.

Nismes, West Bank.

The general health of the people cannot be considered very good.

Malarial fever is very prevalent, and I should say that a considerable proportion of the population suffers from ankylostome infection.

Early in the year quinine was supplied to the children in the schools by the Government. This appears to have had a good effect, as, since it was started, I have seen a much smaller number of children of school age suffering from malarial fever.

The principal diseases treated in the villages were malarial fever, pneumonia, diarrhœa, and dysentery and anæmia.

I saw two fatal cases of undoubted ankylostomiasis during the year.

The sanitary condition of the villages is capable of considerable improvement. The water supply generally is poor and scanty, consisting almost entirely of rain water collected in ponds and trenches and open to contamination. There is too much in the wet season and too little in the dry season.

Latrine accommodation is very poor, only one village having public latrines.

The yards and lots, as a rule, are too much overgrown with bush.

The estates hospitals, with the exception of Schoon Ord, are in good order. At Wales several latrines and new ranges were erected during the year, and the supply of the former is ample. At Versailles four new latrines were erected during the year, and the supply is now good. On the latter estate a large number of cocoanut trees were cut down in the hospital yard and between the ranges. Plantation Schoon Ord, which has no indentured immigrants, has at present only an apology for a hospital. I understand that the authorities of the estate intend pulling down the old one and building a smaller one.

The principal diseases treated in the hospitals were fevers, febricula, diarrhœa, and the usual minor ailments, such as pustules, ground itch, cuts and wounds, &c.

As usual there were several cases of blackwater fever—about fourteen in the hospitals. I saw two in the villages. The mortality has not shown any increase.

W. G. Boase, G.M.O.

Leonora.

The general health was excellent.

The prevailing diseases were malaria, bowel complaints—mostly of a dysenteric nature, and lung troubles—chiefly pneumonia.

There were fewer cases of malaria fever than in the previous year, but bowel complaints were more prevalent—not only in the estates but in the district generally.

Pneumonia, as usual, was the most fatal disease.

Skin affections, ulcers, and A.D. infection are not so common on the estates. Happily, the more serious results of A.D. infection, and to which alone in my opinion the term ankylostomiasis should be applied are rare.

For the first time for years a few cases of enteric fever cropped up.

The prophylaxis of quinine continued to be carried out on the estates; but amongst the villagers its value has not yet been appreciated, though constantly dinned into them.

The mortality throughout was below the average. On the estates the death-rate worked out on the last Census returns was 12·28 per mille. Excluding deaths of strangers picked up on the public road or pastures and deaths from violence the corrected rate would be 10 per 1,000.

The births were in excess of the deaths. On the estates there were 142 living births, giving a birth-rate of 31·7 per 1,000 and eleven still-births. There were nineteen deaths of infants under a year, a few of these being births of the previous year.

The sanitary condition and water supply of the estates are well looked after; that of the only incorporated village and of Hague, which is Government property, are satisfactory, but the others leave much to be desired.

F. A. Neal.

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TUSCHEN, WEST COAST, DEMERARA.

The estates were kept in very good sanitary condition during the year. The hospitals and yards are in good condition, and I am pleased to state that the Managers did their best to follow the recommendations of the Medical Department.

Malarial fever is still on the wane, one looks forward in the immediate future for its total disappearance.

Dysentery is still in the district, but the cases are not of a virulent nature and the death-rate is not high.

	Cases treated	Deaths
Dysentery—		
At Pln. Uitvlugt ...	128 ...	7
,, De Kinderen ...	72 ...	4
,, Tuschen ...	22 ...	2
Malarial fever—		
Pln. Uitvlugt	33 ...	nil.
,, De Kinderen ...	21 ...	,,
,, Tuschen	47 ...	,,

Ankylostomiasis and other intestinal parasites were recognized in the new coolies on their arrival; they were all kept in hospital and treated, with the result that they improved physically and now they are earning normal wages, and were prevented from spreading the infection.

Apart from hospital cases the system is to give beta-naphthol pulverettes; they give me good results. My experience is that they exterminate all intestinal parasites. Thymol does the same, but my drug is beta-naphthol.

Villages.

The villages have improved during the year, but there is still a lot to be desired. I am sure, however, with the efforts that are being made now by the Medical Department the day will soon dawn when the Department will claim absolute success.

J. S. NEDD, G.M.O.

WAKENAAM.

Estate.

The health of the labourers on Marionville Plantation, the only sugar estate on this island, has been good. A most gratifying feature has been the remarkable decrease in the sick and death-rates (with a corresponding increase of the birth-rate) during the last two years.

The population has also been added to by new arrivals; so that, whilst the adult population and the birth-rate have increased, the daily average number of patients in hospital has been lessened by half, and the death-rate reduced to less than a third of the average during the previous five years.

The actual number of deaths during 1913-1914 was fourteen, but two of these were not estate cases; one was a villager who was sent into hospital by me, and the other a vagrant who was found by the police in a moribund condition by the roadside. Both of these cases died within six hours of admission.

During the previous five years (1907-1908 to 1911-1912, both inclusive) in no single year did the birth-rate exceed the death-rate.

The average number of births per annum during those years was 18·8.

The average number of deaths per annum for the corresponding years—39·2—so that for every eighteen births there were thirty-nine deaths.

This certainly was not a creditable record for a sugar estate.

During the last two years the figures have been:—

Average number of births per annum	55
,, ,, deaths ,,	12·5
Daily average number of patients in hospital	20·5
During the previous three years and eleven months, for which period only the figures are available, the daily average number of patients in hospital was	38

This shows a marked improvement in the health and well-being of the labourers on this plantation, and I am sorry I am unable to demonstrate by figures the profit gained, in a monetary sense, by the estate. But it is easy to see that if you have a daily average of thirty-eight people in hospital out of a population of 977, with a death-rate of thirty-nine and a birth-rate of only eighteen, the gain to the estate must be considerable when the daily average in hospital is reduced to twenty in a population of 1,201, with a death-rate of 12·5 and a birth-rate of 55.

This satisfactory state of affairs I attribute to:—

(1) Improved sanitation.

(2) The systematic and efficient administration of quinine.

(3) Since January, 1913, active campaign has been carried on in the treatment of persons found affected with *Ankylostoma duodenale*.

The sanitary improvement has been marked, but there is room for considerable improvement yet. There must be no standing still if the healthy condition of the estate is to be maintained and improved.

That sanitary measures undertaken to improve the health of the labourers on a sugar estate is a good investment is a fact so well recognized that it may be thought superfluous to mention it, but the figures given above, I think, would convince the most sceptical.

The improvement noted in the health and well-being of the population of this estate, as shown in the lowered admissions to hospital and the decreased death-rate began in 1911-1912. This synchronizes with the advent of the present manager, who came from Plantation Peter's Hall to assume the management of this estate.

Mr. Laing is an ardent believer in the gospel of sanitation (and it would be strange if he were not, coming as he did from the Peter's Hall District), and shows the faith that is in him by co-operating cheerfully with the medical officer in every measure tending to the betterment of the health conditions of the labourers. The result of this is shown in the figures above quoted.

Defective sanitation is expensive, especially in the presence of the ankylostoma infection, which is so widespread among the labourers on estates and in the villages. A labourer suffering from this disease has to be treated for some time, and if infection is severe, this has to be done in hospital. This, of course, costs money, in addition to the loss of the man's labour. When discharged from hospital, unless the sanitary arrangements on the estate are satisfactory, a re-infection takes place, with a commencement of treatment again. This may go on for a considerable time, and may result in the man becoming an expensive burden to the estate and a source of danger to the community.

A few latrines scattered here and there among a population of 1,200 souls are not enough. The latrines should be situated near enough to the dwellings of the people so as to be used at all times. No sane individual believes that the average coolie (or any other labourer for that matter) is going to walk a quarter of a mile, or even 200 yards, on a dark, squally night to get to the nearest latrine. This lack of adequate sanitary arrangement is the weak spot in the campaign against ankylostoma infection. So long as it is possible for human excreta to be deposited on the ground surrounding the labourers' dwellings, so long will the complete eradication of the *A. duodenale* be rendered impossible.

The habits of the ordinary coolie have also to be borne in mind in this connection.

The problem of ankylostoma infection in this colony is a much more difficult one than is generally supposed, but it is not insuperable. The malarial problem is easier to grapple with on the average sugar estate, and, so far as this estate is concerned, a severe case of malarial fever is now extremely rare.

The principal diseases treated were influenza, dysentery, malarial fever, bronchitis, bronchial catarrh, pneumonia, diarrhœa, ulcers, chigoes, ankylostoma infection, and ankylostomiasis.

The number of cases of skin diseases has been greatly reduced.

The mortality rate continues to show a most satisfactory decline, as compared with former years; twelve deaths in a population of 1,222 is fairly good. There is no reason, under ordinary conditions, why the death-rate here should exceed 12 per 1,000 if sanitary measures are efficiently maintained and malaria and ankylostoma infection met and fought as they should be, viz., by preventive measures.

The sanitary condition is gradually being improved, and drainage is good.

The latrines are kept clean and in good sanitary condition, but they are far too few. This is gradually being remedied, I am glad to say.

The water supply is as good as it has ever been, but this is not good enough. The sinking of a deep artesian well would be, in my opinion, a good investment for the estate. With the improvement in the water supply, cases of bowel complaints will practically disappear. The open ponds at present in use are not at all satisfactory.

Storage of rain water in concrete or iron tanks is a very good method, but the capacity of these receptacles must need be enormous to supply a population of 1,200 people, which is increasing yearly, even without taking into account periods of drought, one of which was recently experienced. With an artesian well the supply would be practically inexhaustible, and the quality above reproach.

Villages.

The general health, so far as I am aware, has been fairly satisfactory, taking into account the unfavourable social conditions of the people. So far as my observation goes, I can say without hesitation that the average villager in this district is of a much lower and backward type than is usually found in other parts of the colony. This is very strange, as this is by no means an isolated district. Even in the Mara district the people are of a much higher type.

It is almost impossible to get the people to carry out advice tending to the betterment of their health and promoting their well-being. The further removed the "village" is from the one sugar estate in this district, the lower and more backward the type of villager.

One of my predecessors described the inhabitants of a certain village as "savages" who lived in trees. This may be a libel on them, but I should think living in trees would be healthier than under the "roofs" of the wretched hovels one sees the people clustered around when the weather is fine.

Strong, able-bodied men and women hang around from day to day, doing nothing so far as one can observe. How they support existence is a mystery to me; but of course Nature is kind in this most fertile island.

Up to December 31, 1913, the district boasted four burial societies, all of which appeared to be flourishing. Like most other places in the colony the people dearly love a funeral. The death of a villager, with the subsequent funeral and "nine nights wake," is a welcome break in the monotonous existence of "hanging around doing nothing."

I have succeeded in persuading the members of one of these societies to add on a sick benefit and medical relief scheme to the other "benefits," but the other societies would have none of my "newfangled notions."

Burial societies with medical aid in time of sickness with a distribution of the funds remaining for bonus are of distinct advantage to the members. Such societies are in successful operation in Georgetown, New Amsterdam, and other parts of the colony, and do an immense amount of good to the people in times of sickness.

The principal diseases were: Pneumonia, ankylostomiasis, dysentery, diarrhœa, malarial fever, syphilis, Bright's disease, peritonitis.

The most fatal diseases were:—

Among adults: Pneumonia (of fifty-seven deaths certified, eighteen were due to this disease), ankylostomiasis, dysentery, Bright's disease.

Among children: Malarial fever, diarrhœa, congenital syphilis.

The mortality rate has been very high. In the great majority of cases the medical officer is only called in at the last moment, and when medical aid could be of no use whatever. In fact, as a rule the medical officer is called in as "cover" to the village druggist and to save trouble in procuring a medical certificate when death occurs.

The most distressing feature is the high death-rate of young children and infants. Of fifty-seven deaths certified twenty-nine were children and infants.

Of these sixteen died within forty-eight hours after I had been called in.

During the quarter ended March 31, 1914, of eleven deaths of infants under 1 year, only two were seen by a medical man before death.

The sanitary condition is gradually being improved, and compares favourably with the state of affairs in previous years.

Drainage in most of the villages has been well looked after, and there is distinct improvement here also.

Latrine accommodation is very defective. This is a weak spot that requires careful attention if the campaign against ankylostoma infection is to be successful.

The water supply is not satisfactory. A deep artesian well in a central part of the district would be a boon to the villagers.

J. Sholto Douglas, G.M.O.

Suddie.

There is only one sugar estate in the district, but connected with it are two others, L'Union and Taymouth Manor. Patients from these are sent in to Golden Fleece Hospital and so swell the numbers. What still more vitiated the statistics was that while the deaths were recorded against Golden Fleece, the births were registered in the Registration districts in which they were included. This anomaly has now been altered, and all births and deaths registered at Golden Fleece.

During the year there were 1,171 patients treated with thirty-two deaths, giving a percentage of 2·7.

The diseases suffered from were of the usual kind, malarial fever, bronchitis, and pneumonia, and catarrhal affections of the intestines.

The chief causes of deaths were malarial fever, 3; bronchitis and pneumonia, 11; and dysentery and diarrhœa, 4.

The sanitation and water supply are good. The ground around the ranges is well kept, and a good plan, which with advantage might be adopted by other estates, is in vogue; large receptacles are placed conveniently among the ranges, into which all rubbish and domestic debris are placed and periodically removed.

Quinine is steadily pushed with the corresponding advantage to the health and efficiency of the labourers. The question of ankylostome infection is not lost sight of, and suitable treatment is being adopted to eradicate it.

All requisitions of the medical inspector have been complied with. Two new stairways have been supplied to the hospital, and advantage has been taken to enlarge the dispensary.

Much, if anything, cannot be said of the sanitation of the villages. All of them require the bush to be weeded and in some the trees trimmed, so as to allow the sun to dry the ground.

None of the villages have a proper water supply, and in drought find it hard and troublesome to get water.

C. F. Castor.

Anna Regina.

The general health of the inhabitants has been fairly good. There was an increase in cases of influenza during the latter part of the year, as also in the number of trivial fugitive cases of doubtful malarial fever.

In Anna Regina Hospital there were 1,641 cases treated, as against 1,056 cases the year previous, with thirty-eight deaths as against seventeen. In Hampton Court Hospital there were 1,284 cases, as against 734 for the year before, with twenty-six deaths, as against fourteen. At Anna Regina fourteen deaths took place within twenty-four hours, three within forty-eight, and two within seventy-two hours.

The sanitary condition of the estates continues to show improvements, notably so at Plantation Anna Regina. The hospitals were kept in a satisfactory condition. The water supply is good of its kind, but poor at all times. At Anna Regina the water is in constant flow, and is as good as it can be for trench water. In both estates the trenches are fenced in and kept as free from pollution as possible.

The systematic distribution of quinine to children and adults on the estates has been thoroughly carried out.

Ankylostomiasis has been tackled during the year vigorously, but there is more infection than the disease; true ankylostomiasis is uncommon on the estates. The usual two methods of treatment are used—one the intensive, which is carried out in the hospitals, the other the outdoor treatment of 10 gr. daily. I prefer the former method.

Villages.

The general health of the villages has been fairly good. The principal diseases treated were malarial fever, influenza, and bronchial affection generally. Children suffered greatly from whooping-cough in the latter part of the year, and convulsions.

Still-births are higher, I think, than they should be. There is no certified nurse-midwife in the district. The so-called "middies" lack the most elementary knowledge in the management of a lying-in room.

A qualified midwife would be a boon to the district.

The sanitary condition shows improvement in most villages, notably in Queenstown and Henrietta. The water supply comes from the lakes and is good, but all these open trenches are liable to pollution.

J. Teixeira.

Colonial Medical Reports.—No. 70.—British Guiana.

PRELIMINARY REPORT ON THE AMELIORATION AND CONTROL OF ANKYLOSTOMIASIS IN THE PETER'S HALL DISTRICT OF BRITISH GUIANA.

By E. E. FIELD, M.D.Edin., D.P.H.Camb.

Supervising Medical Officer.

INTRODUCTORY REMARKS.

By K. S. Wise, M.B., B.S.,

Surgeon General.

Surgeon General's Office,
Georgetown, Demerara,
April 26, 1915.

The report is a full one, and gives in excellent detail an exact account of the work performed. It lacks certain detailed statistical tables, which will be forwarded later.

This work began on March 12, 1914, on which date Dr. Howard, the special representative of the International Health Commission, arrived in British Guiana. Dr. Howard remained in charge until July, at which time Dr. Field was specially seconded from the Colonial Service to supervise the work. In each case the Supervising Medical Officer has had the advantage of the advice and special experience of Dr. Ferguson, the Government Medical Officer of the Peter's Hall District.

The object attempted was the systematic examination of all persons in the villages of the Peter's Hall District and the expulsion of all hookworms from those infected. The result has been a great reduction in the number of persons infected, a great reduction in the intensity of the individual infection, and a marked amelioration of symptoms due to hookworm infection.

During the progress of the campaign special attention has been directed to the accuracy of the records, since some estimate was required of the effect of the Commission's operations, and no effort was spared to make it as complete and full as possible under the circumstances.

To diagnose the presence or absence of hookworm infection is largely a matter of microscopical technique, and paragraphs 10-18 of this report show the care devoted thereto. On the accuracy of these microscopical examinations rests the accuracy of the estimate of the campaign's value.

It must be realized that the earlier microscopical examinations had not the same thoroughness as those of a later period, and it should not be forgotten that the initial census error was probably from 18 to 29 per cent. of those examined. At the latter end of the campaign the error was reduced to about 3 per cent.

This campaign was carried out in a village population of 10,380 persons with a known infection of 5,590 persons and a probable infection of 7,119; it has brought 5,160 persons under treatment by thymol; it has rendered 4,109 apparently free from infection, but really only 3,986 (owing to microscopic error). The result is that probably 3,261 (31 per cent. of the 10,380) were at the beginning free of infection, while 7,255 (70 per cent. of the 10,380) were free at the end of the campaign. (*Vide* paragraph 21 of the report.)

Difficulties other than micropscopical ones are illustrated in the various tables, especially that of paragraph 21. The inhabitants of these villages come and go at will, thus 10·5 per cent. (1,091) were not traced or departed after the census, some seeking work, or planting short crops temporarily elsewhere, others drifting in and out of the large city near by. Some persons evaded treatment, others flatly refused and repulsed all offers, a certain number abandoned treatment after begun, others again drifted away during the period of treament. In this way 5·4 per cent. (582) were lost. Some few were too weakly and diseased to bear the treatment, 4·6 per cent. (484) had to be abandoned when it became necessary to close the campaign on March 31, 1915.

While it will be possible in future work to reduce the microscopical error, difficulties such as the above will always influence adversely the possible results, though the various factors will vary with the position of the villages, with the season of the year, and so forth.

The campaign began on March 12, 1914, and closed on March 31, 1915. This is an unduly long period and may be accounted for by several causes: firstly, no such work had been done before in British Guiana, and it was necessary to feel the way; secondly, it was experimental in the earlier stages, and work which might have been done in Areas A and C was delayed to watch the course of operations in B; thirdly, the slow and prolonged daily method of thymol administration was adopted in Area B; fourthly, the approximation of Area A to the City of Georgetown resulted in prolonging the time from January to March in order to trace and treat the few remaining persons in daily employment in the city. Subsequent experience shows that the whole campaign might have been completed in seven to eight months.

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No campaign against hookworm disease can ever be of much use without previous or coincident sanitary work. In this respect the International Health Commission has had the co-operation of the Government Public Health Department. In this sanitary work the International Health Commission took no part, save that of education, of advice, and of persuasion. The actual work was done by the Government Public Health Department through its officers. With the advice of Dr. Howard, a special type of pit latrine, protected against flies, fowls, and animals, was adopted, and the villagers required to conform to this type. Over 1,000 new ones have been erected and some 600 improved. In the northern part of the district there are very few houses without such an adjunct, but in the southern half less success has been achieved, and it is there that houses are found unprovided. The outbreak of the European War in August depleted the staff of the Public Health Department and has delayed the plans laid down.

Apart from the special provision of latrines, and apart from prosecutions for disposal of night soil otherwise, the district has profited by a general change for the better. The main and interlot drainage has been cleaned out, the screening of vats and barrels accomplished, the dense overhanging bush and unnecessary vegetation cleared away. Many insanitary buildings have been removed, bakehouses and provision shops cleaned and reconstructed, accumulations of rubbish removed, and ventilation increased.

The villagers themselves, realizing the benefits accruing from work of this nature, have levied an additional rate to pay for a special sanitary inspector for the district who has been at work since November 1, 1914.

The International Health Commission set itself a problem replete with meticulous detail and surrounded with unknown difficulty when attempting to make a microscopical examination of every individual in the villages of the Peter's Hall District and to treat all those found infected; that such success has attended their first attempt indicates a wonderful confidence and the willing co-operation of the villagers, and will remain a record of monumental patience and skilful tact on the part of the Supervising Medical Officer and of Dr. Ferguson.

Representatives of the International Health Commission in British Guiana, who undertook to carry out the work of amelioration and control of ankylostomiasis in the Peter's Hall District:—

(1) H. H. Howard, M.D., Director for the West Indies, International Health Commission.

(2) K. S. Wise, M.B., B.S., B.Sc., D.P.H., Surgeon General, British Guiana.

(3) J. E. A. Ferguson, M.B., C.M., Government Medical Officer, British Guiana.

(4) F. E. Field, M.B., Ch.B., D.P.H., Government Officer, British Guiana.

(1) The work of controlling ankylostomiasis in British Guiana by the International Health Commission of the United States of America was first begun in the Peter's Hall District in March, 1914. The district is roughly nine miles long, has villages and sugar plantations on both sides of one long and continuous road, has, excluding sugar estates not dealt with, a population of 10,380 persons, including men, women, and children, it is situated on the east bank of the Demerara River, and is coterminus with Georgetown. The district, for purposes of administration, was divided into areas, which were each financed separately, and designated Area "A," Area "B," and Area "C."

PETER'S HALL DISTRICT.

Village population 10,380.

Area "A."	Area "B."	Area "C."
Population 3,986.	Population 3,562.	Population 2,833.
Villages of :—	Villages of :—	Villages of :—
La Penitence.	Agricola.	Mocha.
Alexander Ville.	Eccles.	Arcadia.
Meadow Bank.	Bagotstown.	Covent Garden.
Houstou Front.	Peter's Hall.	Prospect.
	Providence Pasture.	Diamond Front.
		Big Grove.
		Little Grove.
		Craig.
		Hope.

(2) On the commencement of the work in the district, the methods for control were before the Commission for the adoption, one a daily method which was extensively and successively used by Dr. J. E. A. Ferguson, Government Medical Officer of the colony, on the sugar estates and the other the weekly or intensive method, also extensively and successively used by the Commission in the United States of America. The decision come to by the Commission was that Area "B" should be worked by Dr. Ferguson's "daily" method, and Areas "A" and "C" by their "weekly" method, and, accordingly, that was the plan of control adopted, and worked to as near completion as possible. Area "B" was commenced in March, "C" in September, and "A" in November, 1914. "B" and "C" were together completed in January, 1915, and "A" in March of the same year.

(3) The important considerations for the successful working of the campaign were as follows:—

(1) Selection of the district and mapping out of areas.

(2) Improvement of sanitation.

(3) Education of the people.

(4) Census taking of the population.

(5) Microscopical examination.

(6) Treatment.

(7) Maintaining of statistical records and careful auditing.

(8) Issuing of certificates of health.

SELECTION OF THE DISTRICT.

(4) The selection of the Peter's Hall District as the first in British Guiana for attempting the eradication of ankylostomiasis was made for the following reasons:—

(1) To obtain the co-operation and advice of Dr. Ferguson, who had successfully carried on a hookworm campaign in the district among the East Indian immigrants who were attached to the sugar plantations.

(2) On account of the intelligence of the people in this district as to previous efforts made to deal with the disease.

(3) Its close proximity and easy access to Georgetown.

1 and 2 were of great value to us, but 3 so hampered us that we would lay it down as an axiom that the further away from the city centres the more successful would such a campaign be. As will be seen in the summaries for the three areas, "C," the farthest away from the city, was the most successful in every respect, even although the people in that area could accept treatment only at some inconvenience to themselves, owing to their being often compelled to work seven days in every week.

In mapping out the areas consideration was given to natural boundaries, and an effort was made to approximate, as near as possible, the number of population in each area.

IMPROVEMENT OF SANITATION.

(5) The aim of the Commission is not only to cure a given population of ankylostomiasis and ankylostome infection, but to provide against possible reinfection of the people. To carry out the wishes of the Commission, therefore, it is incumbent on all Local Governments to see that proper latrine accommodation is instituted in a district before any attempt at treatment is commenced. With this condition in front of them—the representatives of the Commission in British Guiana—immediately the Peter's Hall District was selected as the one in which the campaign should first begin, instituted an active sanitary campaign in the district, and the work was entrusted to the Government Sanitary Department, with the Supervising Medical Officer and staff of the Commission co-operating, by delivering lectures advocating sanitary improvements, affixing throughout the villages placards pointing to the value of good sanitation, and also verbally advising the people to erect latrines and maintain them in good condition. How well this branch of the work has been carried out is shown in the following tables:—

BEFORE CAMPAIGN.

		Latrines.- Class			
Houses	Individuals	D	E	F	Total
2,638 ...	10,380 ...	307 ...	546	1.267 ...	2,120[1]

[1] Incorrect census taken. Should have been 2,638 houses and latrines.

D latrine—One where night soil falls on ground, but is protected from flies, fowls, and animals.

E latrine—One built for concealment alone, with no protection from flies, fowls, and animals.

F latrine—No latrine accommodation.

AFTER CAMPAIGN.

		Latrines. -Class			
Houses	Individuals	D	E	F	Total
2,638 ...	10,380 ...	1,440 ...	317 ...	881 ...	2,638

(6) Early as the sanitary campaign had been on the field, its work was not nearly completed before treatment commenced; and we would strongly advocate that in future the sanitary work should, if possible, be completed not less than one year in advance of treatment for the following reasons:—

(1) That the available time possessed by the field labourer is so small, that if he engages to put his sanitary matters in order he will not have the time to attend to the correcting of his physical ailments.

(2) That if the soil is contaminated within one year previous to treatment, there is no guarantee that cured persons will not be reinfected.

(3) That if treatment is effected before sanitary matters are attended to, there is not only the certainty that reinfection will occur, but the majority of the people, once armed with a certificate of health, would not readily consent to undergo a second course of treatment, if soon after their "cure" they were informed that reinfection had occurred.

The type of latrine adopted for the villages is the ordinary pit privy, with a banking of clay around the bottom of the superstructure to prevent surface water from reaching the pit. The pit is made to have dimensions 3 ft. long, 2 ft. wide, and 2½ ft. deep, the shallowness preventing the tapping of the ground water, which in the wet seasons of the year is very high.

EDUCATION OF THE PEOPLE.

(7) When it is remembered that successful control of the disease is dependent on the voluntary co-operation of the people, that they are asked to forgo social events and attendance at church on the one day in the week when taking the "weekly" treatment, permit themselves to be freely purged once weekly ("weekly" treatment) for probably a month or six weeks, and that in many cases superstitions handed down for generations must be broken, it will be seen that educational measures are not only necessary but absolutely essential. Education in sanitary matters is just as much necessary as education in the curative side of ankylostomiasis, but proper sanitary provision can be enforced by law, whereas we are still at the stage where considérable latitude is allowed to the subject to take or refuse remedial measures to cure himself of disease, even although his resistance to treatment might endanger the health of not only a village, but might probably endanger the health of a State.

(8) Recognising, therefore, the need for suitable instruction of the people, the plan adopted was to give lantern demonstrations, and affix throughout the villages posters fully illustrative of all phases in the disease, days, and in some cases months, before Census taking. These demonstrations were given at night and were largely attended. In addition, demonstrations were given to school children; the villagers were encouraged to bring their own stools, and themselves see under the microscope the ova in their excreta, and the Supervising Medical Officer was always in his office, or in the homes, instructing the people concerning the disease and advising the necessity for getting rid of it. Work was not commenced in a village until we were quite satisfied that the majority of the people were fully acquainted with the disease and strongly desired our presence among them, and then the census of the population was commenced. With census taking, pamphlets were also given at every house, giving particulars about the disease, the method of treatment, and the precautions to be taken when under treatment.

Lectures and Attendance.

	Schools	Attendance	Public	Attendance	Special	Attendance
Area "A"	—	—	—	—	2	440
Area "B"	2	312	10	1,400	1	1,800
Area "C"	2	380	7	238	2	700
Totals	4	692	17	1,638	5	2,940

(9) Taking the whole Peter's Hall District, twenty-six lectures (twenty-two of which were associated with lantern demonstrations) were given with 5,270 attending, 1,556 posters were stuck up, and 4,526 pamphlets issued.

	Lectures	Attendance
Schools ...	4	692
Public ...	17	1,638
Special ...	5	2,940
Totals	26	5,270

Literature.

Locality	Circulars	Sheets	Others
Areas "A" "B" and "C"	4,506	1,556	20

Census Taking.

(10) Census taking consisted in taking the names, age, race, and sex of the people, affixing a number to each house, distributing pamphlets dealing with the disease and its treatment, giving out containers to every individual, and collecting the same with excreta. But for purposes of convenience we will also here go into the question of the percentage of the whole district.

The villages of the whole of the Peter's Hall District (excluding Albouystown, which has been incorporated with Georgetown) were found to have a population of 10,380. Of this number, 9,537 were microscopically examined; 5,590 were found to have *Ankylostomum duodenale* ova; 3,947 to be free from ova; and 843 persons were not traced and not examined, but must be considered persons who are likely to form, at some time or other, members of the district community.

When taking the census, we were of opinion that three negative smeared slides of a stool were sufficient evidence, that a person was free from infection, and it was on that presumption that we obtained the figures of our positive and negative cases in the census. Our opinion was based on the recommendations of previous workers, and that opinion was the one we had every reason to believe was the generally accepted one.

(11) We have subsequently found by experiment (see Microscopical Examinations, Table "A") that if a stool is found negative on three smeared slides, the microscopical error on 100 such is 18—29 per cent. with a mean 24 per cent. This figure was found in re-examinations, carried out from one to four weeks after thymol had been taken, and the question might well be asked whether the ingested thymol might not have had some effect on the results. In answer, we would state that we are of opinion that the thymol taken had had no bearing for or against on the figures, since the re-examinations were never made before its ill-effects must have had ample time to wear off the parasites, and were never made before one week after its ingestion. In proof of this we found that by combining the results obtained from five smeared slides from the original specimen, and five smeared slides from a centrifuged emulsion of the same stool, we were able to improve on the results obtained by the five smeared slides by no less than 11 per cent. (See Table "B" in Microscopical Examinations.) Now if an 11 per cent. improvement was obtained by a thorough examination on the results of an examination made with five slides, that improvement could not have been less than 18 per cent. if the combined method had been employed to improve on the results got with three smeared slides.

Another point that should have some consideration is, whether the large error on the first re-examinations may not have been due to want of skill on the part of the microscopist. We do not think so, and feel satisfied that the error was due entirely to the fact (1) that in the re-examinations we were dealing with only minute particles of a large mass, (2) that the ova were not evenly disseminated throughout the stools, (3) and that if stools had few ova they would have required many repeated examinations, with particles taken from many parts of the stools, before the ova could have been discovered.

What bearing can this large error have on the results got in our census? It means that we must have been out not less than 18 per cent. in our results in positive and negative cases, and if we have conclusively shown that the error on the three smeared slides was entirely due to insufficient microscopical examination of each stool, and was correctly 18 to 29 per cent., then the mean 24 per cent. should be taken as the error in our positive and negative cases, and that instead of the figures reading population, 10,380; positive, 5,590; negative 3,947; not traced and not examined, 843, they should really read negative, 3,261 (3,947 less 24 per cent. plus 261), and positive 7,119, or 31 per cent. negative, and 69 per cent. positive of population.

MICROSCOPICAL EXAMINATIONS.

(12) Recognition of the fact that the fundamental basis of the campaign depended on the accurate microscopical interpretation of stools submitted for examination led us, at the commencement of the campaign, to engage not only men who had had some years microscopical experience in estates hospitals, and whose time had been devoted almost entirely to work of that nature. Three East Indians who possessed the necessary qualifications were engaged, and since then others have been employed, but it is on the original three that we have depended almost entirely for the successful working of the Microscopical Department. We would also point out that, by combining in a very marked degree the necessary industry and painstaking, the East Indian will be found to be one who is specially suited to this kind of work.

(13) The procedure first adopted to determine the number of infected and non-infected persons in the villages was to microscopically examine smeared slides of the stools of all the inhabitants, and to obtain three negative smeared slides before a person was considered free from ankylostome infection. The results obtained from such examinations can have been by no means accurate ones, and the percentage of infected persons must have been far larger than our early censuses showed; in fact, the error must have been anything from 18 per cent. to 29 per cent. But it must be remembered that, although that high percentage of infected persons escaped detection and consequent treatment, their infection must have been very slight indeed. Subsequently, it was decided that not less than five to eight negative smeared slides should be examined before a conclusion was come to that a stool contained no ankylostome ova, and this has been productive in reducing, on the West Bank, our initial census error from 18 to 29 per cent. to 10 per cent.

(14) To determine whether a person was cured, three negative smeared slides from one stool were required to be got one week after the last dose of thymol was administered, and at the end of a second, and in some cases a third week, a similar examination was required to be carried out before a "cure" was considered established. Table "A," which deals with some of the re-examinations carried out on this plan, gives a tolerable idea of the value of this method. A glance at the Agricola figures shows that if re-examination of only one specimen has been made, there would have been an error of 19·5 per cent., and taking the figures for Bagotstown it will be seen that that error would have risen to 29 per cent.! The third re-examination figures show that the second re-examination error in "cured" was 2 per cent. in Eccles, 2·5 per cent. in Agricola, and 4 per cent. in Bagotstown. No figures are available for a fourth re-examination, but if one had been made, it would only have shown the error on the third re-examination to have been one of a very low decimal figure. To be able to detect ova in a third re-examination, a most careful, painstaking, and diligent search had to be made, and often, and in a great majority of cases, when they were found, there were but one or two on the eighth smeared slide. The inference that may be drawn, therefore, is that if one had in a third re-examination to go to the eighth slide to detect one or possibly two ova, often four weeks after the last thymol administration, the infection in the 2 per cent., 2·5 per cent., and the 4 per cent. persons left uncured in Eccles, Agricola, and Bagotstown must have been trivial and of little moment. A fourth, and possibly a fifth, re-examination would have been of great clinical value, considering the large numbers of people we were dealing with, but it was unfortunately not possible for us to obtain them by reason of the unwillingness of the people to give specimens. To obtain specimens for the second re-examination difficulties were encountered, and these were very considerably increased when persons were approached for the third. In the great majority of villages we were, under the circumstances, satisfied with two re-examinations, for we clearly recognized that, besides the 2 to 4 per cent. mildly infected persons we were leaving behind who had undergone treatment almost to a cure, we were also leaving behind persons who had been microscopically examined at the time of taking census, but in whom we failed to detect ova, besides other persons in whom ova were detected, but who had not undergone treatment to a cure for various reasons to be explained.

TABLE "A."

(15) Re-examination of stool after treatment in Area "B," Peter's Hall District, showing differences in results in making three re-examinations, and using three smeared slides in each examination.

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Agricola.

First re-examination of stools one week after thymol administration	Second re-examination one week after, of persons found negative in their first re-examination	Third re-examination one week after, of persons found negative in their first and second re-examination
Number of stools examined 475	Number of stools examined 300	Number of stools examined 237
,, positive to A.D. 142	,, positive to A.D. 50	,, positive to A.D. 6
,, negative to A.D. 333	,, negative to A.D. 250	,, negative to A.D. 231
30 per cent. positive	17 per cent. positive	2·5 per cent. positive
70 ,, negative	83 ,, negative	97 ,, negative

Eccles.

First re-examination	Second re-examination	Third re-examination
Number of stools examined 204	Number of stools examined 112	
,, positive to A.D. 89	,, positive to A.D. 18	
,, negative to A.D. 115	,, negative to A.D. 94	
44 per cent. positive	16 per cent. positive	2 per cent. positive
56 ,, negative	84 ,, negative	98 ,, negative

Bagotstown.

First re-examination	Second re-examination	Third re-examination
Number of stools examined 257	Number of stools examined 146	
,, positive to A.D. 97	,, positive to A.D. 37	
,, negative to A.D. 160	,, negative to A.D. 109	
38 per cent. positive	25 per cent. positive	4 per cent. positive
62 ,, negative	75 ,, negative	96 ,, negative

Conclusion.—The error on one microscopical examination, using three smears on as many slides, varies from 18 per cent. to 29 per cent.

(16) The difficulty in obtaining specimens for a second re-examination was obviated, about four months after the commencement of the campaign, by introducing a centrifuge made by Bausch and Lomb,[1] to the design of Dr. H. H. Howard.[2] The centrifuge is much the same as the one in use for ordinary clinical purposes, but, in place of the two metal tube holders, a metal pan is fitted on which is carried twenty glass tubes. The procedure recommended to us in examining was as follows: A particle of stool is placed in a small flat-bottomed glass tube and agitated in water until an emulsion is formed. The emulsion is strained through coarse gauze, to retain all coarse particles, into one of the glass tubes that is to be inserted into the metal pan. and, on preparing twenty such tubes, the machine is swiftly revolved until one is satisfied that serimentation has taken place. Fitted with corks at both ends of the glass tube, the cork is taken from the sedimentation end and the smears made. On its introduction it was decided to pronounce a "cure" with one re-examination, using five smeared slides from the emulsion, but checking the results so obtained by placing the results of five smeared slides from the original specimen against it. We were rather surprised at first to find that the superiority of the centrifugal method, over that of the smeared slides, was little more than fractional, and immediately altered our technique by incorporating in the emulsion particles from many portions of the specimen. This manœuvre gave us an immediate improvement in the results of the centrifugal method over the smeared slides, and reference to Table "B" shows this to be 3 per cent. In Table "A" we found that with one re-examination, using three smeared slides, the error in "cured" was 18 to 29 per cent. Had five to eight smeared slides been employed instead of three, this error would have been reduced approximately to 10 per cent. therefore we are entitled to conclude that, by using five smears of the centrifugalized emulsion the error is only 5 to 16 per cent., since five to eight smeared slides are more than 10 per cent. better than three, and since the centrifugalized emulsion is better than the five smeared slides by 3 per cent. But by combining the results obtained from five smeared slides from the original specimen, and the results obtained by five smears from the centrifugalized emulsion, the combined results are better than the five smeared slides by 11 per cent., as shown in Table "B," therefore we must conclude that the combined method only allows an error of 0 minus 1 per cent. to 0 plus 1 per cent. In conclusion it may be said that, in examining any given number of stools by the combined method, allowance need only be made for the small error of 1 per cent. to 0 minus 1 per cent., and that a second re-examination is not necessary.

(17) The combined method was adopted in area "A" throughout all the re-examinations, but was only employed in about one-third of the re-examinations in area "C," and not at all in area "B." We may therefore say that, apart from 1,100 cures in area "A," 4 per cent. microscopical error in "cures" in areas "A" and "B" has to be taken into account in estimating the number of infected persons who remained infected after the close of the campaign in the district. Taking the Peter's Hall District as a whole, the total microscopic error in "cures" is 3 per cent.

The total amount of work done in the district by the Microscopical Department was as follows:—

Total number of persons examined microscopically ...	9,537
,, stools examined...	22,282
,, smeared slides examined (approximately)	100,000

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[1] Bausch and Lomb, Rochester, N.Y., U.S.A.

[2] H. H. Howard, M.D., Rockefeller Foundation, Washington, D.C., U.S.A.

TABLE "B."

(18) Re-examination of stools after treatment in "A," Peter's Hall District, showing differences in results, in the slide smear method, the centrifuge, and the combination of the slide smear method and the centrifuge.

Re-examination by five smeared slides			Re-examination by centrifuge and five smeared slides			Combined results of centrifuge and smeared slides	
Number of stools examined	700	..	Number of stools examined	700	...	Number of stools examined	700
,, positive to A.D.	308	...	,, positive to A.D.	329	...	,, positive to A.D.	382
,, negative to A.D.	392	...	,, negative to A.D.	371	...	,, negative to A.D.	312
44 per cent. positive		...	47 per cent. positive		...	55 per cent. positive	
56 ,, negative		...	53 ,, negative		...	45 ,, negative	

Conclusion.—The improvement on one examination, in the combined use of the centrifuge, and five smeared slides—from the original specimen—over five smeared slides only in 11 per cent.

TREATMENT AREA "B," "DAILY" METHOD.

(19) The treatment in this area was carried out on the "Daily" method devised by Dr. J. E. A. Ferguson. It consisted in administering daily 10 gr. of thymol in capsules to all infected adults until a cure was effected. No purge was given, and in children the dose was diminished according to age. Table "C" gives in detail the average amount of thymol required to effect a cure based on this method, and the time that was taken to do so. The efficiency of the method, excluding altogether financial considerations, may be seen at a glance by consulting the following table.

		Population		Non-infected persons at beginning of campaign		Non-infected persons at close of campaign		Duration
Area "B" "daily" method	...	3,562	...	31 per cent.	...	69 per cent.	...	9 months
Area "C" "weekly" method	...	2,832	...	23 ,,	...	76 ,,	...	4½ ,,
Area "A" "weekly" method	...	3,986	...	39 ,,	...	67 ,,	...	5 ,,

The adoption of this method will be found to have its greatest efficiency:—

(1) Where the persons to be treated are under strict control, such as on sugar plantations, and combined with 2 and 3.

(2) Where there is no physician, and where dispensers only are available.

(3) Where there is insufficiency of physicians to control the working of large districts under the "Intensive" or "Weekly" method.

(20) SUMMARY OF AREA "B," PETER'S HALL DISTRICT, AT THE CLOSE OF CAMPAIGN.

	Agricola	Eccles	Bagotstown	Peter's Hall	Providence Pasture	Total
Census return	1,330	343	780	718	389	3,562
Not traced and not examined	120	10	101	72	53	356
Negative to ankylostomum duodenale	575	72	288	260	93	1,288
Positive to ankylostomum duodenale	635	261	393	386	243	1,918
Removed and not treated	14	5	10	9	3	41
Given first treatment	621	256	383	376	240	1,876
Refused and not treated	—	—	—	1	—	1
Not treated on medical grounds	—	—	—	—	—	—
Abandoned after first treatment	24	3	11	12	6	56
Removed after first treatment	60	17	48	18	20	163
Cured	485	210	282	279	171	1,427
Treated but not cured	50	25	40	66	42	223
Died (from natural causes and not from thymol)	2	1	2	1	1	7

Population, 3,562. 1,288 negative to A.D. less 24 per cent. microscopical error = 1,288—309 = 977, or 31 per cent. of persons examined. 979 plus 110 (31 per cent. of 356 not traced and not examined) = 1,089 negative to A.D. at beginning of campaign. 1,089 plus 1,370 (1,427 cured less 4 per cent. microscopical error 57) plus 7 died = 2,466 persons negative at end of campaign. 1,089 = 31 per cent. of population negative at commencement of campaign. 69 per cent. of population positive at commencement of campaign. 2,466 = 69 per cent. of population negative at close of campaign. 31 per cent. of population positive at close of campaign.

(21) SUMMARY OF AREAS IN PETER'S HALL DISTRICT.

	Area "A"	Area "B"	Area "C"	Total
Census return	3,986	3,562	2,832	10,380
Not traced and not examined	411	356	76	846
Negative to ankylostomum duodenale	1,816	1,288	843	3,947
Positive to ankylostomum duodenale	1,759	1,918	1,913	5,590
Removed and not treated	140	41	67	248
Given first treatment	1,514	1,876	1,770	5,160
Refused and not treated	15	1	6	22
Not treated on medical grounds	90	—	70	160
Abandoned after first treatment	37	56	5	98
Removed after first treatment	180	163	119	462
Cured	1,121	1,427	1,561	4,109
Treated but not cured	176	223	85	484
Died (from natural causes and not from thymol)	(1)*	7	—	7

* (Died before receiving treatment. Reported but not counted.)

Population, 10,380. Negative to A.D. 3,947 less 24 per cent. microscopical error =3,000 (31 per cent. of persons examined) plus 261 (31 per cent. of 843 not traced and not examined) = 3,261 negative to A.D. at beginning of campaign. 3,261 plus 3,986 (3 per cent. microscopical error of 4,109 cured) plus 8 died = 7,255 persons negative at end of campaign. 3,261 = 31 per cent. of population negative at commencement of campaign. 69 per cent. of population positive at commencement of campaign. 7,255 = 70 per cent. of population negative at close of campaign. 30 per cent. of population positive at close of campaign.

AREA "B," TABLE "C."

(22) Showing the persons treated to a cure, the time taken to effect their cure, and the quantity of thymol used.

Villages of—	1 month. 4 per cent., 25 caps., 250 grs.	2 months. 23 per cent., 50 caps., 500 grs.	3 months. 56 per cent., 75 caps., 750 grs.	4 months. 80 per cent., 100 caps., 1,000 grs.	5 months. 92 per cent., 125 caps., 1,250 grs.	6 months. 97 per cent., 150 caps., 1,500 grs.	7 months. 98 per cent., 175 caps., 1,750 grs.	8 months. 99 per cent., 200 caps., 2,000 grs.	9 months. 100 per cent., over 200 caps., over 2,000 grs.	Total
Agricola	20	87	111	167	56	20	12	7	5	485
Eccles	5	33	45	66	42	10	6	3	—	210
Bagotstown	15	54	118	44	24	18	8	1	—	282
Peter's Hall	12	57	137	48	20	4	1	—	—	279
Providence Pasture	7	34	74	29	12	12	3	—	—	171
Total	59	265	485	354	154	64	30	11	5	1,427

Total persons treated by "daily" method 1,876
,, treatments given by "daily" ,, ... 148,821

TREATMENT AREAS "A" AND "C"—"WEEKLY" METHOD.

(23) This method, the one adopted by the Commission for all further work in this country, consists in the giving of a preliminary purge in the evening, thymol on the following morning, and, three hours after the administration of the last dose of thymol, a purgative to clear off the ingested thymol, and, with it, the worms affected by the anthelmintic. This procedure is repeated on the same day of the following week, and at the end of the next week, if no ova are found, a certificate to that effect is given. Treatment is continued once weekly, with re-examinations following a week after, until a cure is effected, if infection is still found after the second treatment.

The popularity of this method among the village people was due to the fact that: (1) About 50 per cent. of those infected required only two treatments to have a "cure" effected, and that these "cures" were brought about in a few weeks. (2) Persons engaged in pursuits far removed from their village could, on their going home, be treated, cured, and again leave for their work within a month. (3) The physical improvement was so rapid that it could be easily perceived.

(24) The method will be found to have its greatest efficiency: (1) Among people free from indenture. (2) Where there is a physician present to control the administration of the drug. (3) Where the persons under treatment are not too numerous to be under the supervision of the physician.

Valuable as the method is, it would be well to point out that there are certain dangers associated with its application, and recognizing these dangers, we would emphatically state that on no account should it be employed without the direct supervision of a medical officer. It should not be employed: (1) Where persons are suffering from advanced cardiac disease. (2) Where persons are suffering from Bright's disease. (3) In pregnant women. (4) Where there is old age associated with cardiac weakness. (5) In chronic bowel complaints, such as chronic dysentery, or chronic diarrhœa associated with old age.

(25) As regards the danger of toxic effects arising from the administration of the drug, we are inclined to believe that it is of little moment, providing alcohol and oily substances are avoided on the day when large doses are administered. Of 5,160 persons treated, we have seen only two persons in a state of marked intoxication, and this complication was entirely got rid in a few hours after the administration of an infusion of coffee without milk or sugar.

An advantage possessed by the "Daily" method is that in "3" of the foregoing, in which the "Weekly" method may not be used, it may be employed with perfect safety. In many cases the physician will get a satisfactory result, when treating persons greatly enfeebled by ankylostomiasis, by using the "Daily" method for a few weeks, and employing the "Weekly" with a recovery in the general tone of the patient.

(26) The table drawn up to show the percentage of persons cured with varying number of treatments shows that about 50 per cent. of 2,620 persons cured required only two treatments, but that cases were come across that required not less than eleven treatments. The large percentage of persons cured with two treatments can be accounted for by reason of the following: (1) They were not heavily infected. (2) Might be considered mild cases of ankylostome infection. (3) May have been cases in which the anthelmintic must have its maximum effect on the nematodes by virtue of the fact that the parasites were little buried in the mucus secretion, commonly found in association with heavily infected persons, and persons in whom the disease has been of long standing.

(27) With these facts in view, together with the fact that the table deals with a large number of comparatively healthy persons, the very large

majority of whom were engaged in pursuits requiring great physical strength and endurance, and whose vitality could not reasonably be compared with the enfeeblement of the ordinary case seen in hospital suffering from the same infection, there can be no difficulty, even to the mind of the layman, in understanding why the experience gained with markedly anæmic and heavily infected persons seen in hospital should not, and cannot, be employed as a contrast with these persons, as to the number of treatments required to effect a cure, and why a larger percentage of village infected persons should require fewer treatments than those found in hospital suffering from the same disease.

(28) SUMMARY OF AREA "A," PETER'S HALL DISTRICT AT THE CLOSE OF CAMPAIGN.

	La Penitence		Alexander Ville				Meadow Bank	Houston Front	Total
	East	West	Company Path	North	South	West			
Census return	918	569	115	794	688	308	520	74	3,986
Not trained and not examined	140	101	2	37	46	29	53	3	411
Negative to ankylostomum duodenale ...	401	264	50	432	298	151	190	30	1,816
Positive to ankylostomum duodenale ...	377	204	63	325	344	12[illegible]	277	41	1,759
Removed and not treated	25	12	4	23	30	8	35	3	140
Given first treatment	332	184	56	280	239	110	218	35	1,514
Refused and not treated	—	—	—	3	2	1	9	—	15
Not treated on medical grounds	20	8	3	19	13	9	15	3	90
Abandoned after first treatment	3	5	3	10	12	1	3	—	37
Removed after first treatment	72	30	4	21	31	11	7	4	* 180
Cured	203	136	35	221	204	83	208	31	1,121
Treated but not cured	54	13	14	28	52	15	—	—	176
To be treated...	154	60	25	82	125	35	† 45	† 7	533
Died (from natural causes and not from thymol)	—	—	—	—	—	—	1	—	1

* Removed from village. † Active sanitary campaign in progress.

Population, 3,986. Negative to A.D. 1,816 less 24 per cent. microscopical error = 1,380. 1,380 (39 per cent. of persons examined) plus 160 (39 per cent. of 411 not traced and not examined) = 1,540 negative to A. D. at beginning of campaign. 1,540 plus 1,122 = 2,662 persons negative at end of campaign. 1,540 = 39 per cent. of population of commencement of campaign; 61 per cent. of population positive at commencement of campaign. 2,662 = 67 per cent. of population negative at close of campagn; 33 per cent. of population positive at close of campaign.

(30) SUMMARY OF AREA "C." PETER'S HALL DISTRICT AT THE CLOSE OF CAMPAIGN.

	Mocha	Arcadia	Covent Garden	Prospect	Diamond Front	Big Grove	Little Grove	Craig	Hope	Total
Census return ..	256	189	359	82	80	1,129	399	310	28	2,132
Not traced and not examined ...	12	13	11	2	2	18	13	5	–	76
Negative to ankylostomum duodenale	96	52	125	39	22	282	105	114	8	843
Positive to ankylostomum duodenale	148	124	223	41	56	829	281	191	20	1,913
Removed and not treated ...	3	1	10	2	—	36	9	6	—	67
Given first treatment	140	110	208	38	50	767	260	179	18	1,770
Refused and not treated	—	—	—	—	—	6	—	—	—	6
Not treated on medical grounds...	5	13	5	1	6	20	12	6	2	70
Abandoned after first treatment... ...	1	—	1	—	—	2	—	1	—	5
Removed after first treatment	5	4	11	2	3	68	13	12	1	119
Cured	134	106	196	36	46	622	239	165	17	1,561
Treated but not cured	–	—	—	—	1	75	8	1	—	85
To be treated	* 9	* 5	* 22	* 4	4	181	30	20	* 1	276
Died (from natural causes and not from thymol) .	—	—	—	—	—	—	—	—	—	—

* Removed from village.

Population, 2,832. Negative to A.D. 843 less 24 per cent. microscopical error = 641 or 23 per cent. of persons examined. 641 plus 17 (23 per cent. of 76 not traced and not examined) = 658 negative to A.D. at beginning of campaign. 658 plus 1,499 (4 per cent. microscopical error of 1,561 cured), 2,157 negative at end of campaign. 658 = 23 per cent. of population negative at commencement of campaign; 77 per cent. of population positive at commencement of campaign. 2,157 = 76 per cent. of population negative at close of campaign; 24 per cent. of population positive at close of campaign.

Colonial Medical Reports.—No. 70.—British Guiana (*continued*).

(32) SUMMARY OF "CURES" SHOWING NUMBER OF TREATMENTS REQUIRED AND DURATION OF CAMPAIGN.

Area "A." Duration of Campaign Five months.

Locality	Treatments 1	2	3	4	5	6	7	8	9	10	11	Total
La Penitence—												
East	4	111	51	28	5	2	1	1	—	—	—	203
West	—	58	34	28	7	3	3	—	—	1	2	136
Alexander Ville—												
Company Path	—	24	10	—	—	1	—	—	—	—	—	35
North	6	114	62	27	9	2	—	1	—	—	—	221
South	1	103	64	20	12	2	2	—	—	—	—	204
West	1	42	26	8	4	2	—	—	—	—	—	83
Meadow Bank	10	122	43	23	6	4	—	—	—	—	—	208
Houston Front	1	15	7	7	1	—	—	—	—	—	—	31
Totals	23	589	297	141	44	16	6	2	—	1	2	1,121

Area "C." Duration of Campaign Four and half months.

Locality	Treatments 1	2	3	4	5	6	7	8	9	10	11	Total
Mocha	6	54	38	21	9	3	3	—	—	—	—	134
Arcadia	3	43	37	11	9	1	—	1	1	—	—	106
Covent Garden	1	96	58	26	12	2	—	1	—	—	—	196
Prospect	—	14	11	7	3	1	—	—	—	—	—	36
Diamond Front	1	23	14	7	1	—	—	—	—	—	—	46
Big Grove	32	333	174	57	25	1	—	—	—	—	—	622
Little Grove	3	117	67	35	14	2	1	—	—	—	—	239
Craig	1	91	50	18	4	1	—	—	—	—	—	165
Hope	—	10	2	5	—	—	—	—	—	—	—	17
Totals	47	781	451	187	77	11	4	2	1	—	—	1,561

(33) TABLE "E."—SUMMARY OF CURES SHOWING NUMBER OF TREATMENTS REQUIRED AND PERCENTAGE OF CURES TO NUMBER OF TREATMENTS.

Area "A."

	Treatments 1	2	3	4	5	6	7	8	9	10	11	Total
	23	589	297	141	44	16	6	2	-	1	2	1,121
Percentage	2	53	26	13	4	1	0·54	0·18	—	0·10	0·18	100

Area "C."

	Treatments 1	2	3	4	5	6	7	8	9	10	11	Total
	47	781	451	187	77	11	4	2	1	—	—	1,561
Percentage	3	50	29	12	4·94	0·70	0·26	0·13	0·50	—	—	100·08

Total persons treated by "weekly" or "intensive" method	3,284
Total treatments given by "weekly" or "intensive" method	8,628

(34) COMPARATIVE COST OF THE THREE AREAS OF THE PETER'S HALL DISTRICT.

Duration of campaign	Approximate cost as given in previous reports	Persons cured
Area "A."		
From November 1, 1914, to March 27, 1915. 5 months	$ 1,982.66	1,121
Area "B."		
From March 28, 1914, to January 23, 1915. 9½ months	*4,555.56	1,370
Area "C."		
From September 1, 1914, to January 16, 1915. 4½ months	$ 1,152.45	1,499

Approximate cost after adjusting the proportion of thymol used in each area.

Area "A"	$ 1,900.04
Area "B"	*3,964.33
Area "C"	1,235.07
	$ 7,099.44
Total approximate cost of whole district	$7,099.44

CONCLUSION.

(35) The following may be taken as indicative of the achievement by the International Health Commission in the Peter's Hall District of British Guiana. (1) Cured 39 per cent. of 69 per cent., i.e., 57 per cent. (3,986 persons cured), infected persons in the district village population (10,380 persons), of a disease which, directly and indirectly, causes in this and other tropical countries more deaths than would the ravages of cholera. The figure of 57 per cent. of the infected cured does not mean that the remaining 43 per cent. persons are going about the district heavily infected, and spreading infection broadcast (no less than 24 per cent. on the census figures, and 3 per cent. on the re-examination figures, have been allowed by us for our microscopical error), but simply means that the very last worm has not been removed from the majority of them, a matter of small significance to their health, and, with the provision of sanitary latrines, a matter of little danger to these persons cured, and those who were not infected. (2) Educated the inhabitants as to the cure and prevention of ankylostomiasis. (3) Co-operated with the Government Sanitary Department in placing the district on a healthy sanitary footing. (4) Given a new lease of life to many persons more or less incapacitated for work. (5) Restored arrested development in some of the young persons. (6) Made way for an increase of the birth-rate, and decrease of the death-rate, in a country where there is need for increased population. (7) Successfully demonstrated that ankylostomiasis can be controlled, and with care in details, almost to complete eradication.

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* The high cost of this area is in part due to the area bearing the entire cost of the office staff for six months.

Colonial Medical Reports.—No. 71.—Grenada.

MEDICAL REPORT FOR THE YEAR 1915.

By E. F. HATTON, M.D.,

Colonial Surgeon.

PUBLIC HEALTH.

The health of the Colony during the year was not good. This was to a great extent due to epidemic dysentery; this disease was epidemic last year and the epidemic continued in the parish of St. John into this year, and there was a recrudescence of the complaint in many parts of the Colony this year. The number of deaths from this disease was 341, last year 297. The general death-rate was 24·36, as compared to 21·29 last year.

Malaria.

This disease was fairly prevalent during the latter months of the year; though prevalent it was not of a very severe type and yielded readily to ordinary doses of quinine. The number of deaths registered as due to this disease was 147.

The only large anti-malarial measure taken during the year was the draining and filling up of the low lands at Queen's Park. The expenditure for the year on this work was £2,000. I cannot claim that this expenditure was altogether on the score of sanitation, sport and recreation probably had a greater influence, but sanitation will benefit to a considerable extent. The scheme has not proceeded sufficiently far as yet to have any appreciable effect on the health of those living in the neighbourhood.

Good results are now being felt from the drainage of the town of Grenville undertaken during the two preceding years.

In the middle of the year it was decided by the Governor in Council to grant free medicines to persons of the labouring class suffering from malaria. Medicines are now supplied free of cost to paupers, labourers' children under 10 years, labourers over 60 years, police constables and prisoners, to all labourers suffering from yaws, syphilis, malaria, ankylostomiasis.

Water Supply.

The Island generally is blessed with an abundant water supply. Most of the towns and many parts of the rural districts have good pipe-borne water, but there are certain districts which are very badly off in this respect. These are Carriacou, Woburn, River Sallee. Carriacou is dependent on ponds and shallow wells. The water of the ponds is polluted by every kind of filth, and that of the wells is often brackish. Some improvement has been made during the past year by fencing in the ponds and covering the wells. Pumps will also be supplied to avoid polluting by dipping buckets into the water. It has not been found possible this year to do anything to supply the inhabitants of Woburn with potable water, but a scheme has been prepared to supply this district with pipe-borne water, when money is available.

Leaflets and notices have been issued frequently, advising that water in these localities should be boiled before being used internally.

Latrines.

A great effort is being made both by the International Health Commission and by the Government sanitary inspectors to establish an efficient latrine system in the rural districts.

An amendment was made to the Public Health Ordinance making the provision of adequate privy accommodation for every house compulsory and regulating the disposal of human excreta.

Sanitary inspectors have been making house-to-house visits instructing the people in these matters. Some little improvement is noticeable.

The condition of the latrines at the primary schools has received considerable attention, and the building of public latrines in some of the villages is under consideration.

The establishment of a proper system of latrines throughout the Colony is, in my opinion, the most urgent sanitary problem before the authorities at the present time.

Ankylostomiasis.

An energetic campaign against this disease is being prosecuted by the International Health Commission with funds provided by the Rockefeller Foundation. The work is under the charge of Dr. Angus Macdonald assisted by Dr. Morrison, with a staff of microscopists, nurses, and inspectors. The parishes of St. George and St. David have been worked during the past year, and at the present time the parish of St. Andrew is being dealt with. Good work has been done both in the way of education and treatment.

Lectures and demonstrations with lantern slides have been given in many parts of the Island and have been well attended by the persons whom it was intended to benefit.

NOTIFIABLE DISEASES.

Typhoid.—There were twenty-four cases of this disease notified: males, sixteen; females, eight.

RETURN OF DISEASES AND DEATHS IN 1915 IN THE COLONY HOSPITAL, YAWS, CONSUMPTIVE AND DISTRICT HOSPITALS.

Grenada.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	16	—	17
Anæmia	30	—	34
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	—	—	—
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	4	1	4
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	95	25	104
Enteric Fever	14	2	15
Erysipelas	—	—	—
Febricula	—	—	
Filariasis	—	—	—
Gonorrhœa	—	—	—
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	20	—	21
Kalar-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	—	—	—
(*c*) Mixed	—	—	—
Malarial Fever—	164	4	168
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(*c*) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps		—	—
New Growths—	—	—	—
Non-malignant	40	1	45
Malignant	13	2	15
Old Age	1	1	1
Other Diseases	330	5	346
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	8	—	8
Rheumatism	4	—	6
Rheumatoid Arthritis	31		33
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	134	—	148
(*a*) Primary	—	—	—
(*b*) Secondary	—	—	—
(*c*) Tertiary	—	—	—
(*d*) Congenital	—		—
Tetanus	3	2	3
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(*a*) Phthisis Pulmonalis	51	29	66
(*b*) Tuberculosis of Glands	—	—	
(*c*) Lupus		—	—

GENERAL DISEASES *continued*.	Admissions	Deaths	Total Cases Treated
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	4	—	4
Varicella	—	—	—
Whooping Cough	—	—	—
Yaws	605	—	663
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	—	—	—
Circulatory System	20	—	21
(*a*) Valvular Disease of Heart	—	—	—
(*b*) Other Diseases	57	10	64
Digestive System—	—	—	—
(*a*) Diarrhœa	44	10	48
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	28	—	34
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	—	—	—
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	4	—	4
(*g*) Cirrhosis of Liver	9	1	10
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	10	3	10
Ear	2	—	2
Eye	23	—	26
Generative System—	—	—	—
Male Organs	83	4	92
Female Organs	119	6	129
Lymphatic System	—	—	—
Mental Diseases	—	—	—
Nervous System	56	5	58
Nose	23	1	25
Organs of Locomotion	—	—	—
Respiratory System	98	12	107
Skin—	—	—	—
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	35	—	35
(*f*) Other Diseases	471	—	499
Urinary System	—	—	—
Injuries, General, Local	—	—	—
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(*c*) Other Injuries	11	3	11
Parasites—	—	—	—
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	75	—	84
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	1	—	1
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	—	—	—
Amputations, Major	1	—	1
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(*c*) Other Eye Operations	—		—

Diphtheria.—One case of this disease was reported. This was a young child; the case ended fatally, and no bacteriological examination of the membrane was made.

Leprosy.—One case of this disease was notified during the year. There is no leper asylum in the Colony; there are four lepers in the Poor Asylum and one provided with a room elsewhere. Isolation of these cases is very desirable.

Tuberculosis.—This disease was made notifiable on July 1, 1913. The number of cases notified this year was seventy-eight: males, thirty-nine; females, thirty-nine. In 1914 the number notified was seventy-three: males, twenty-eight; females, forty-five. In 1913 the number was 111: males, thirty-nine; females, seventy-two. The number of deaths registered from pulmonary tuberculosis was sixty-three. Of these twenty-seven were males and thirty-six females.

There were thirty-six deaths from this disease in the parish of St. George, twenty-seven of whom died in the Consumptive Hospital which is situated in this parish. Many of those dying in this Hospital belonged to other parishes. The deaths from tuberculosis were seventy-two.

The occupation of those notified to be suffering was: Labourers, 40; domestic servants, 3; no occupation, 17; planters, 2; school children, 3; sailor, 1; seamstresses, 2; mechanic, 1; clerks, 7; priest, 1; police, 1; total, 78.

RECORD OF PATHOLOGICAL WORK FOR GOVERNMENT INSTITUTIONS AND GENERAL MEDICAL PRACTITIONERS, FOR YEAR ENDED DECEMBER 31, 1915.

Material examined	Investigation desired	No. of specimens
Fæces	Intestinal parasites ..	556
Blood ...	Malaria	28
,, ...	Enteric fever	1
,, (mule) ...	Anthrax	1
,, (mules) . .	Piroplasmosis ...	14
Urine	Blackwater fever ...	1
,, ...	Tuberculosis	1
,, ...	Schistosomiasis ...	2
Serum	Ulcers	11
Sputum ...	Tuberculosis	62
Pus	Various	5
Swabs	Diphtheria	2
Ticks (3 species) ...	Piroplasmosis ...	3
Smears	Yaws	12
Water	Enteric, &c.	14
Various	Various	36

HOSPITALS AND ASYLUMS.

	No. of beds	Total number treated
Colony Hospital	140 ...	2,010
Yaws Hospital	70 ...	663
Consumptive Hospital .	20 ...	54
*St. Andrew's Hospital	12 ...	220
Carriacou Hospital . . .	24 . .	252
Lunatic Asylum .	120 ..	132
Poor Asylum	58 .	82
*St. George's Dispensary	— .	2,534

* Out patients daily.

Small-pox.—There was no case of small-pox during the year. Vaccination was satisfactorily carried out. The lymph supplied was of good quality and arrived regularly except at the end of the year when, owing to the irregularity of the steamers, there was some little delay; arrangements have now been made to have it sent via New York.

Pellagra is not a notifiable disease, but two cases are reported at the Lunatic Asylum: a woman from St. Vincent, who has been in the Asylum since 1903, and one in the town of St. George.

Yaws.—This disease is dealt with under a special ordinance, the Yaws Prevention Ordinance of 1883. This ordinance provides for compulsory segregation of persons suffering from yaws. The number of cases admitted to the Hospital last year was the largest on record, viz., 605.

The number of cases treated with salvarsan was twenty; the small number was due to the failure of the New York merchants to supply the drug. It was not obtainable. Notwithstanding the large number of cases treated, the prevalence of the disease is as great as at any time during recent years.

The Colony was free from any quarantinable disease throughout the year, though plague, yellow fever, and small-pox were reported from neighbouring countries.

THE COLONY HOSPITAL.

The out-patient department was removed from this Institution to premises in Melville Street, and also the Dispensary.

Two visits of surprise were paid by His Excellency the Governor during the year.

The total number of patients admitted during the year was 1,887; there were ninety-nine deaths, a large percentage of these deaths could be accounted for by dysentery in the early months of the year.

The operations performed numbered 108; these do not include the minor surgical ones performed in the wards during visits.

THE YAWS HOSPITAL.

The total number of patients admitted during the year was 605, with this must be reckoned fifty-eight more, which remained over from the previous year, 1914. This large increase, as compared with the previous year, was due to the fact that the sanitary inspectors took the trouble to discover the patients.

Twenty patients were treated with salvarsan; this number is very small, but it was impossible to obtain more of the drug, in spite of repeated attempts to do so from America.

The numbers at the Hospital were so great that the inspectors had to be told not to send in too many at a time, as the vote for dietary ran short and an additional amount had to be asked for.

The following list shows the districts from which the patients came: St. George's, 223; Gouyave and St. John's, 81; Victoria and St. Mark's, 66; St. Patrick's, 41; St. Andrew's, 85; St. David's, 103; Carriacou, 6; total, 605.

J. WHITEMAN, *Acting Resident Surgeon.*

Colonial Medical Reports.—No. 71.—Grenada (*continued*).

THE CONSUMPTIVE HOSPITAL.

This Hospital provides for twenty patients, ten males and ten females. It is situated outside the town of St. George, on a hill about 600 ft. above the sea. It is for tuberculous patients only. The number of patients treated during the year was 54: males, 25; females, 29. The number remaining from previous year was 15: males, 5; females, 10. The number admitted during the year was 39: males, 20; females, 19. Of the 54 treated 27 died: males, 12; females, 15. The number discharged was 18: males, 9; females, 9. The number remaining in at the end of 1915 was 9: males, 4; females, 5; many of the cases admitted were in an advanced state and offered little hope of cure. A few cases in the early stage were treated with tuberculin.

The buildings and grounds have been maintained in good order throughout the year.

E. F. HATTON, *Medical Superintendent.*

THE ST. ANDREW'S HOSPITAL.

Two hundred and twenty patients were treated in the wards. The number of males and females admitted was almost equal.

The average number of inmates was 12. The Hospital was therefore full all the year round. Races were represented by 38 East Indians, 1 white, and 181 coloured patients. Place of birth: Grenada, 198; Carriacou, 5; Barbadoes, 9; St. Vincent, 4; Guadeloupe, 1; and India, 3.

The religious professions made by inmates on entry were: 109 Anglican, 107 Roman Catholic, 2 Wesleyan, 1 Salvation Army, 1 Seventh Day Adventist. Ministers of the first three Churches visited the Hospital from time to time. I must thank those residents of the parish who kindly gave illustrated papers to amuse and interest the patients.

The Hospital buildings are in good order, but require painting. The Public Works Department promptly remedied any minor defects when reported. The grounds about the Hospital have always been neat and well kept.

Much credit is due to Mr. P. H. Louhar, District Dispenser and Hospital Steward, for his industry in coping with the enormous pressure of compounding over 1,200 prescriptions a month.

N. S. DURRANT, *M. O., St. Andrew's Hospital.*

THE LUNATIC ASYLUM.

The total number of persons treated during the year was 132: males, 61; females, 71. There were 110 remaining in from the previous year: males, 49; females, 61. The number admitted was 22: males, 12; females, 10. Of the 132 under treatment 6 died: males, 4; females, 2. The number discharged was 19: males, 9; females, 10. There were remaining in at the end of 1915, 107: males, 48; females, 59.

Of those who died one, a male, was from St. Vincent, and 5 belonged to Grenada.

Of those discharged, one was from St. Vincent and was sent back to the St. Vincent Asylum after having been in this Asylum for thirty-three years. The number discharged belonging to Grenada was 18.

Of the 22 admitted during the year 10, 5 males and 5 females, had been in an asylum at least once before, and 5 males and 7 females were admitted for the first time.

The death-rate based on the daily average was equal to 5·50 per cent.

The percentage of discharges based on the number of admissions was 85·90.

Restraint.—The number of seclusions under lock and key was 170. This large number of seclusions was resorted to: (*a*) In cases of recurrent mania; (*b*) to keep inmates out of the rain; (*c*) for those who would not keep on their clothes; (*d*) for those who were removed from dormitories and infirmaries at night for quarrelsome behaviour.

The restraint belt with gloves was used eleven times. The longest time being seven hours. The most frequent reason for resorting to this form of restraint was to prevent a male patient committing an unnatural offence on another.

Employment.—The men were chiefly employed in gardening, cleaning, carpentry, painting and mason work. All minor repairs and painting were done by inmates and attendants. The women were employed in sewing and clothes washing.

THE POOR ASYLUM.

The accommodation of this institution is for 58 persons: males, 38; females, 20. The number of persons treated in this Asylum was 82: males, 57; females, 25. The number remaining in at the end of the previous year was 54: males 35; females, 19. The number admitted during the year was 28: males, 22; females, 6. The number discharged was 10: males, 8; females, 2. The number who died was 15: males, 13; females, 2. The number remaining in at the end of 1915 was 57: males, 36; females, 21.

Of those who died, 2 were between 80 and 90 years of age, 6 were between 70 and 80, 1 was between 60 and 70, 2 were between 50 and 60, 3 were between 40 and 50, 1 was between 30 and 40.

The daily average number of inmates was 55·29: males, 35·54; females, 19·75.

The grounds have been kept in order chiefly by the attendants and inmates of the Poor Asylum.

DISTRICT No. 1.

The population of the district for the year under review would be about 4,572, and is obtained by adding to it 72, which represents the excess of the births over the deaths for 1915.

No account is taken of the effects of emigration or immigration, and the number of deaths returned for the Colony Hospital is excluded in the calculation.

The year was on the whole a very healthy one, but contrary to the usual order, there was a more marked prevalence of dysentery and malarial fever during its earlier months.

The total number of deaths recorded was 62, representing the low death-rate of 13·50 per 1,000; the largest numbers were recorded in January and August, but were not attributable to any particular seasonal condition.

There was no increase in the incidence of sickness during the rainy months as usually obtains; as already stated, the largest number of cases of dysentery and malarial fever, 40 and 86 respectively, were met with during the first quarter.

Remarks on particular Diseases that have occurred during the Year.

Pulmonary Tuberculosis.—The number of cases seen was 20, as compared with 12 and 15 for the past two years, respectively.

The methods for controlling the disease are by notification to the Government and local health authority; admission of the poorer classes of patients to the Tuberculosis Hospital at Richmond Hill; provision of disinfectants and spit-cups, when required; and frequent inspections by the sanitary inspectors of houses in which cases exist; and thorough disinfection of the premises occupied by tuberculous cases on their evacuation.

Leprosy.—One new case of the nodular variety, which came from the No. 2 District, was seen and notified.

No provision for segregating cases of this disease has yet been made, although the necessity for so doing has frequently been pointed out.

Yaws.—Of three cases reported one only originated in this district. This small number does not represent the actual incidence of the disease in the district, as cases are sent to hospital direct by the sanitary inspectors, without the intervention of the District Medical Officer; but the cases originating in the town are few.

Dysentery.—The number of cases seen was 109, a number far in excess of those for the past two years. Cases were met with during the whole year, but of the total number seen, 40 occurred during the first quarter, when, as a rule, dysentery is by no means prevalent.

Typhoid Fever (Enteric).—Five cases were seen; the numbers for 1914, 1913, and 1912 were 7, 3, and 9 respectively. Although the incidence of this disease in the town of St. George must be regarded as being very low, yet the desirability of having an isolation ward at the Colony Hospital for the admission of cases occurring among the poorer classes exists all the same.

Malarial Fever.—The number of cases seen was 236, as compared with 556 and 312 for the past two years. The area from which this number was drawn was much smaller this year than formerly, owing to the reduction in the size of the district; but on the whole malarial fever was less prevalent than usual; the largest number, eighty-five, was seen during the first quarter.

One case of black-water fever was seen in town; the patient was employed and lived during the greater part of the week at Happy Hill, No. 3 District. The history obtained was one of repeated attacks of malarial fever with quinine taken at irregular intervals for it. The case made a satisfactory recovery.

Syphilis.—The number of cases seen was fifteen. Free treatment is also provided for all persons of the labouring classes suffering from this disease; but in spite of this it is a very difficult matter to get them to come forward for treatment for a sufficiently long period.

Pellagra.—One case of this disease in a woman was seen in town. The signs and symptoms were characteristic, viz., discoloration of the skin at back of wrists, face, and front of legs, gastro-intestinal disturbances, and weakness of limbs and mental instability.

The general sanitary condition of the district was good on the whole. There was no great prevalence of malarial fever, but dysentery was represented by the large number of 109 cases. The disease was most prevalent in the Tanteen, Villa lands and Green Street sections of the town. In order to limit its spread the houses in which cases had occurred and their surroundings were disinfected, particular attention being paid to all probably infected spots due to the indiscriminate disposal of excreta on the surface of the land.

I may here refer to the repeated references in the Sanitary Inspector's reports to the disposal of human fæces about the streets, drains, and empty lots of the town; the appointment of a night watchman should be effective in reducing the evil.

I am of opinion that it is by this reprehensible practice of indiscriminate scattering about of night soil that dysentery is mainly spread in this district. I referred last year to the advisability of providing additional public latrines.

The polluted condition of the water supply alluded to in my last report has not been observed so frequently during the year, but still it has been quite noticeable at times following on heavy rains.

During the dry months the dust in town still causes a great deal of inconvenience; the means adopted for dealing with it being very far from effective; frequent watering of the streets is urgently needed.

The old offensive method of disposal of night soil still obtains; as stated before, nothing but the introduction of a water sewerage system can end this.

The number of successful vaccinations of infants was ninety-seven; in addition to this the community derives protection from small-pox by the vaccination and revaccination of adults, the result of quarantine restrictions.

During the year certain quarantinable diseases were reported from the following places and the authorized restrictions were imposed as the necessity arose: Venezuela for plague, yellow fever, and small-pox; Vera Cruz (Mexico), French Guiana and Demerara for small-pox; Buenaventura (Colombia) for yellow fever. A severe outbreak of anthrax was also reported from Demerara. None of these diseases were introduced into the Colony, nor was quarantine imposed against it at any time during the year.

G. W. Paterson,
Medical Officer and Health Officer.

DISTRICT No. 2.

There were 184 births and 96 deaths during the year.

A glance at the following table will readily show the incidence of sickness during the year:—

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Typhoid	—	—	*	1
Dysentery	52	47	*	83
Malaria	99	104	*	79
Malignant new growth	—	2	*	—
Syphilis	43	35	*	34
Tetanus	3	3	*	3
Yaws	—	9	*	1
Tuberculosis	—	3	*	3

* No figures available.

Relative Mortality in the Different Seasons.—January, 11; February, 10; March, 4; April, 6; May, 7; June, 2; July, 10; August, 6; September, 13; October, 11; November, 8; December, 8.

At the inauguration of the Grenada Branch of the British Medical Association I read a paper on "The Treatment of Malaria by the Ferments Trypsin and Amylopsin." Further use of these ferments has convinced me of their superiority over quinine, I therefore once more recommend their trial to the medical staff.

Dysentery of a very severe nature made its appearance in the district, in epidemic form, during the months of October and November. It was almost entirely limited to the St. Paul's area. As this is a water-borne disease the supply of water available in this quarter does not appear to be above reproach.

I consider it very necesary that the lands immediately drained by the reservoir should be acquired by the Government, and so prevent contamination of the water by natural and other manures.

The one condition which cries out for immediate reform is the water supply of the southern end of the district. On this subject my predecessor, on March 31 last year, wrote:—

"In this, my first report on the No. 2 District, I merely wish to draw attention to the terrible state of affairs existing at Woburn, as far as the water supply is concerned. I attended a midwifery case in that village, and it was quite impossible for me to obtain water for the purpose of sterilizing my instruments. This is a state of affairs which should not exist."

The suffering experienced by the people in this locality for the want of a pipe-borne water supply are indescribable. The only sources available for drinking purposes are a few mud puddles in which pigs bathe and cattle wade knee-deep in the mire.

There were 152 successful vaccinations performed during the year.

CONRAD J. ARTHUR, *Acting M.O., D. 2.*

DISTRICT No. 3.

The population of the district is estimated at 6,200. The births registered numbered 224, the deaths 124. The birth-rate per 1,000 was 36·1, the death-rate 20·0.

The year was on the whole an unhealthy one. Dysentery was much in evidence throughout the year, cases occurring in all parts of the district. At Mt. Moritz the disease assumed epidemic proportions for a brief period during the third quarter. The cases attended numbered 202, eighty of which occurred in the third quarter.

Malarial fever was also very prevalent during the wet season. In the area comprising Granton, Willis and New Hampshire the disease was extremely prevalent during the latter half of the year.

Gastro-enteritis among infants, the result of improper feeding, was also of frequent occurrence and contributed largely to the high sick-rate and mortality throughout the year.

Of the 124 deaths during the year sixty-one occurred in children of 2 years of age and under. This high infantile mortality is deplorable, and is in many instances the result of ignorance or inability on the part of the labouring population to provide a suitable diet for their infants. "Bread tea," flour and arrowroot pap are the usual substitutes which the nursing mother provides for her tender infant while she is away at work during the greater part of the day. On such a diet an infant cannot thrive. The wonder is that many more do not succumb.

The sick-rate during the second half of the year, which roughly corresponds with the wet season, was slightly higher than in the first half. Dysentery and malarial fever were more prevalent during the wetter months.

Remarks on particular Diseases that have occurred during the Year.

Tuberculosis.—Three cases of consumption occurred in the district.

Dysentery.—This disease was seen all through the year and all over the district. It assumed epidemic form, however, only in the Mt. Moritz area during the third quarter of the year. Special reports on the prevalence of the disease and the sanitary condition of that area were then submitted to the Acting Colonial Surgeon and a vigorous sanitary campaign was undertaken to check its spread. The 202 cases treated during the year had a case mortality of about 7 per cent.

Typhoid Fever.—Two cases occurred in the district. Both ran typical courses and made uninterrupted recoveries. The source of infection in both cases remained obscure. The usual measures to prevent the spread of infection by disinfection and otherwise were carried out.

Yaws.—There were fifteen cases seen and recommended to the Yaws Hospital. In addition to these the Sanitary Inspector procured admittance for several other cases discovered by him. The disease is by no means uncommon in the district, and its spread does not appear to be affected by the existing method of partial segregation, which leaves in every area a number of cases more than sufficient to ensure the propagation of the disease.

Malaria.—There were nearly 800 cases treated. The disease was very prevalent in certain parts of the district, e.g., Willis, Granton and New Hampshire in the interior, and Beausejour and Grand Mal on the coast; moderately prevalent in some parts, and comparatively infrequent in other parts of the district. In general the disease yielded readily to treatment by quinine. Among the very few obstinate cases two exhibited the symptom of hæmoglobinuria. Both cases had come under the observation of my predecessor in previous attacks of fever. In one the symptom followed the administration of quinine as had occurred on previous occasions.

Ankylostomiasis.—The International Health Commission has dealt with the disease in the bulk of the population in the district and few cases of appreciable infection are now met with. Reinfection, as time goes on, is however certain to occur owing to lack of sustained effort on the part of the labouring population to maintain that standard of domestic sanitation so essential to the success of the campaign.

There is room for considerable improvement in the general sanitary condition of the district.

Individual effort to drain the immediate surroundings of houses is sadly wanting; even the adequate draining of cultivated lands, incidentally so beneficial to the health of the community at large, is woefully neglected.

At New Hampshire a large swamp serves to disseminate malarial infection over a wide area. At Willis, not far removed, the Government have, by the opening of drains and maintaining them in efficient condition, improved in some small measure the lot of the fever stricken dwellers in that locality. But Granton, New Hampshire and Willis will continue to be a heavily infected area as long as the New Hampshire swamp exists.

The drainage of the Queen's Park has already reduced to some considerable extent the prevalence of malarial fever in its immediate neighbourhood.

Indifferent at all times, the Vendome-Boca water supply during the wet season was bad. The Boca filter-beds appeared to be defective, for on several occasions during rainy weather the water leaving them was brownish-red in colour and contained much suspended impurities.

Those parts of the district not supplied by the Vendome-Boca works rely for their water supply on springs and ponds. The springs provide a water of fair quality except where, during wet weather, they are liable to pollution from surface drainage. In localities where there are no springs, e.g., at Mt. Moritz, the inhabitants obtain water from ponds—a source of water-supply teeming with all the abominations of pollution.

With the labouring population disposal of refuse and excreta is a problem of considerable difficulty. Pit closets have been adopted in several areas in the district, but in general the pits as constructed are not satisfactory. They are too shallow. They are uncovered, and they hold water during wet weather. Flies and animals have ready access to them, and mosquitoes breed readily in them during the wet season.

The number of infants under 1 year successfully vaccinated during the year was 197. Thirteen unsuccessful vaccinations were recorded, the result of inert lymph. The infants were regularly brought forward, and very few defaulters had to be referred to the police.

H. Bishop, *M.O.*, *D.* 3.

District No. 4.

The following table shows the estimated population, the births, the deaths, the ratio per 1,000, and a comparison of figures with those of the preceding year:—

Year	Population	Births	Deaths	Birth-rate per thousand	Death-rate per thousand
1914	7988	277	143	34·6	17·9
1915	8007	259	240	30·1	21·0

The birth-rate shows a decrease while, on the other hand, the death-rate shows an increase when compared with that of 1914.

With regard to the prevalence of sickness in the different seasons of the year, during the first four months the general health of the district was most disturbed owing to the prevalence of a severe epidemic of dysentery. During the latter part of the year the greatest number of malarial cases were recorded.

The relative mortality for the different quarters of the year are given in the table below, the mortality being highest during the first quarter owing to the epidemic of dysentery. The death-rate was also high during the third quarter, partly due to dysentery, but also attributable to an epidemic of whooping-cough which obtained at this time.

Year	1st Quarter	2rd Quarter	3rd Quarter	4th Quarter	Total
1914	46	18	23	56	142
1915	89	49	64	38	240

Malarial Fever.—Cases of this disease were recorded throughout the year; the greatest number were, however, recorded between the months of June and November, the wet season. The type of fever was in most cases mild; with a total number of 1,001 cases attended only thirteen deaths are attributable to this disease. Two cases of blackwater fever were recorded, one a recurrent case in a man who was attacked in 1914 and who refused to change his abode and who died, the other a new case, that of a boy on the Dougaldston Estate, who, however, recovered.

Dysentery.—This disease assumed a severe epidemic form during the first four months of the year, during this time 371 cases were attended with 54 deaths. During the other months of the year 102 further cases were attended, giving a total of 473 cases for the year, with a total number of 83 deaths, or about 17·5 per cent., death-rate. The saline, ipecac., bismuth, and emetine treatments were all tried with varying success in different cases. In one or two cases of a very persistent and malignant type small and repeated doses of calomel gave most excellent results.

Colonial Medical Reports.—No. 71.—Grenada (*continued*).

Nothwithstanding the generally accepted opinion that the germs of dysentery are principally spread by drinking water, there can be little doubt the rapid spread of the disease in certain portions of a village (with the same water supply to the whole village), when once a case has developed, indicates the spread of the disease by other sources, such as flies and dust.

Pulmonary Tuberculosis.—Seven cases of this disease were recorded, as compared with eleven cases the previous year. The people continue to be unwilling to take advantage of treatment in the Institution; knowing as they do the fatality of the disease, they regard their being sent to the Institution as the signing of their death warrant, and prefer to remain outside treating themselves with bush, and often their families are unable to look after them and provide them with the necessary nourishment.

Yaws.—This disease continues prevalent, and during the past year eighty-one cases were seen and sent on to the Institution; a good many cases were recurrent ones. This return of the disease, often soon after the patient is discharged from the hospital, being probably due to their being dismissed too early from the Institution in order to make room for others. During the present year for about two months cases have had to be treated in the district and afford nuclei for the further spread and propagation of the disease.

Whooping-cough.—An epidemic of this disease made its appearance in the month of June and continued until the end of September, 183 cases were attended and, as usual, infants and children of tender ages were the chief sufferers, but a few adult cases were recorded. The disease was responsible for thirteen of the deaths recorded in the third quarter.

Sanitation and Anti-malarial Measures.—Additional drainage was laid down, and new drains still in the process of erection are being carried out in the L'Ance portion of the town of Gouyave, and the sanitary condition of this locality is being gradually improved. The dry ravine which becomes a lagoon in the rainy season still exists, want of funds preventing the Town Board from remedying this evil. In the rural portion of the district and at the Estate and other small villages the sanitary condition is fairly good; owing to the energies of the Sanitary Inspector a good deal of improvement is noticeable in the sanitary condition around the houses of the peasants and labourers.

During the year special attention was given to latrine accommodation under the supervision of the Sanitary Inspector. The estates have all adopted the latrine pit system, and the Government schools are also carrying this system into effect; the inhabitants, however, of the small villages and the peasant proprietors still continue to use open holes without a building. These holes, although constantly inspected by the Sanitary Inspector, are far from sanitary, especially in the rainy season when they get waterlogged; the compulsory erection of a latrine building by the poorer classes might appear a hardship. I think, however, it would be quite possible for them to use some rough kind of protection without much outlay by the use of one sheet of galvanize with the aid of some coconut branches.

The attendance for vaccination was satisfactory and the lymph gave good results except during the last month of the year; a total of 248 successful cases on infants under 1 year were performed, being sixteen in excess of the preceding year.

R. D. O'NEALE.

DISTRICT NO. 5.

POPULATION.

	1914	1915
Estimated population	4,102 ...	4,154
Births during the year	156 ...	135
Deaths ,, ,, ...	54 ...	83
Birth-rate per 1,000	38·03 ...	32·49
Death-rate per 1,000	13·16 ...	19·98

It will thus be seen that the births were 21 less and the deaths 29 more than the previous year—most unsatisfactory.

The following figures give the deaths occurring quarterly: First quarter, 15; second quarter, 27; third quarter, 27; fourth quarter, 14; total 83.

Remarks on particular Diseases occurring during the Year.

Dysentery.—There can be little doubt that this disease, which assumed epidemic form during the second and third quarters, was mainly responsible for the high death-rate. Sixteen deaths were recorded from this disease during the year in the following order: First quarter, 3; second quarter, 7; third quarter, 5; fourth quarter, 1.

Pulmonary Tuberculosis.—Of the seven cases seen five have died. One can hardly state too clearly how necessary it is to see this disease in its early stages if any good is to be done. The practice which obtains here of waiting till one is moribund before seeking medical advice is one to be strongly condemned.

Syphilis and Yaws.—The frequency with which yaws is met with at St. Mark's clearly proves that this disease is on the increase. Apart from the loathsomeness of this disease, its tendency to cripple labour is so great as to be one of the chief causes of pauperism in this island.

The general sanitary condition of this district was good, mainly owing to the efforts of the Sanitary Inspector.

Eighty-seven children under 1 year of age were successfully vaccinated. The lymph gave good results.

J. E. COPLAND, *Acting M.O., No. 5.*

DISTRICT NO: 6.

VITAL STATISTICS.

Estimated population	5,985
Births for 1915	223
Still births, 1915	14
Deaths, 1915	145
Number of deaths under 2 years	46
,, ,, over 60 ,, ...	31
Birth-rate for 1915	30·72
Death-rate for 1915	20·30

The population is estimated by adding the excess of births over deaths to that of the previous year.

There were thirty-six deaths more than in 1914. This was due to a severe epidemic of dysentery, aided by a malignant type of malaria. Over 50 per cent. of the deaths occurred in children under 2, and in adults over 60.

Dysentery.—This malady was evidenced in epidemic form during the first seven months of the year. The cases seen in the first three months being of extreme severity; twenty-five deaths were recorded from this ailment.

Malaria was manifest all through the year. Twenty-eight deaths occurred.

Remarks on particular Diseases.

Dysentery.—The cases met with were in the majority of a very severe type; hæmorrhage and intense griping being commonly met with, emetine was freely used hypodermically; in some instances a rapid change for the better took place, in others it absolutely failed to do any good.

The old stager, bismuth, castor oil and opium, rendered great relief and in many cases brought about a cure. The more severe cases were encountered during the first six months of the year, thirteen out of twenty-five deaths being put down to this condition during the first quarter, and ten during the second. Fifty-eight cases were treated between April and June. The cases gradually became less and were practically ended by December.

Malaria.—This district is in all parts essentially a malarial one, cases coming for treatment from all directions. I have been struck by the great number of them who show cerebral trouble, coma, at the very initial stage of the fever, being often encountered; convulsions, cramps, sometimes of one side, sometimes of one arm or one leg, and in other cases involving the entire body.

The stagnant mouths of the Mt. Craven and La Fortune rivers and the adjoining swampy lands, saturated by the waters of these two streams, afford a comfortable residence for anopheles. Added to these breeding areas we have the enormous extent of the Levera swamp. Two of these breeding places are situated on the windward side of the district. This situation gives the mosquitoes an easy course downwind to work their havoc among the population.

Marked results have been obtained in treatment by the intramuscular injection of a soluble salt of quinine, the bihydrochloride being the one used. In nine out of ten cases a cure is effected, but owing to the fact that residence in the polluted area cannot be avoided by the majority of the sufferers a reinfection usually takes place.

The number of attendances on malarial cases for 1915 was 2,208; this number includes 760 second attendances. Persons of all ages, children of a few weeks and old people, were all attacked alike; twenty-eight deaths were registered from this complaint.

Tuberculosis.—Nine cases were seen for the year and five deaths recorded. The cases come for treatment after the condition is well rooted. When the malady arrives at the stage where a diagnosis can be made from physical signs the condition is then far beyond a cure.

Syphilis.—One hundred and thirty-four cases of syphilis came forward during 1915. By far the great majority of them were of a congenital nature in children, and the balance tertiary cases in adults.

A great boon has been conferred on the labouring classes by allowing free medicines for malaria and syphilis; this privilege affords them the opportunity of getting a second or third bottle of physic.

Yaws.—Thirty-six cases were dealt with during the year under survey. This number is by no means an index of the number of cases that exist in the district. Modesty and a false pride prevent many sufferers from coming to the surgery for advice. The services of old grannies are enlisted for treatment. These old women, armed with various concoctions of roots and herbs, carry out experiments on the sufferers. When the cases fail to yield to their treatment they are brought in, in a well-advanced stage.

I cannot close this section of my report without making a few remarks on the great number of children under 2 years who are afflicted with some malady or the other. Malaria, congenital syphilis, and, above all, maladies caused by dietetic errors.

Most of the children suffer from over-nursing, their mothers keep them at it for sixteen to eighteen months; during the last seven or eight months the children draw an abundant supply of a highly unnutritious fluid from the breast. This fills up the stomachs of the poor infants to the exclusion of some other nourishing medium which may have been given instead. As a result the vitality of the children gradually falls below par, swelling of the entire body takes place; this goes on for a few weeks and death ensues. In others, the reverse condition is met with. The children are brought into the surgery in a markedly attenuated condition, the mothers complain that the children are "drying." This shrinking gradually gets more pronounced, and after a few months death closes the scene. A small proportion, however, do recover from this loss of flesh.

No amount of advice will prevent the women from carrying on this deadly habit, as they are firmly of opinion that a prolonged period of nursing will delay pregnancy.

The sanitary condition of the district has been good during the past year. A tour of the district was made by the Medical Officer, accompanied by the Sanitary Inspector, with a view to locating the positions and ascertaining the condition of pit-closets. Those found were seen after and put into proper order.

The water service supplied an ample quantity of a potable quality of water for the greater part of the inhabitants.

The residents in the Chantimelle Mt. Craven and adjoining parts, including the Medical Officer's quarters, have to rely in the dry season on a doubtful supply from springs. This inconvenient state of affairs could easily be remedied by establishing on a small scale a reservoir at any of the springs in the vicinity, and running a pipe along the main road from which a household service could be laid.

Two hundred and four vaccinations were performed during 1915. The lymph supplied never failed to produce good results.

EDWIN WELLS, M.B.

DISTRICT No. 7.

The estimated population based on the 1911 census was 6,912:—

	1914	1915
Population	6,780	6,912
Births during the year...	273	271
Deaths ,, ,,	122	149
Birth-rate per 1,000 ...	40·2	39·2
Death-rate	18·0	21·5

The greater number of deaths occurred in children under 2 years of age, the majority of whom died from gastro-intestinal troubles resulting from improper feeding. The increase in the death-rate is more apparent than real, and was due to the continuance of the epidemic of dysentery during the first quarter of the year.

Owing to the continuance of the epidemic of dysentery there was a great deal more sickness during the first quarter of the year than usual. The year as a whole may be described as one of comparative good health.

With the reduction, however, in the tariff of fees and an increasing appreciation of medical aid by the labouring classes, especially with respect to their children, it is almost impossible at times to cope with the work. The magnitude of the task can easily be imagined when it is remembered that one has to deal with over 7,000 people irregularly distributed over a large area of country in which a great number of the roads can only be characterized as being distinctly bad, more particularly during the wet season.

The total number of deaths last year was 149. In analysing these deaths one cannot but be struck by the high infant mortality due to gross dietetic errors. With wages stationary, however, and the cost of living markedly increasing, such a state of affairs must necessarily exist, so that so far as the children are concerned, handicapped as they are at so tender an age, it is merely a matter of "the survival of the fittest."

Meteorological Conditions affecting Public Health.—The rainfall for the year was abundant, and began earlier by a perfect deluge about the middle of what is regarded as the dry season. This downpour lasted for two days and did considerable damage to the roads and plantations, but cannot be said to have affected public health in any marked manner except in so far as the epidemic of dysentery was concerned. It may be coincidence, or not, but it is worthy of remark that the epidemic rapidly subsided, and this scourge of six consecutive months came to an abrupt termination. After this the rainfall assumed normal proportions, and the usual seasonable variations with respect to disease were observed.

Remarks on particular Diseases.

Malaria.—This disease headed the list as usual in the number of cases, and was as prevalent as ever. This is not surprising when it is remembered that the greater portion of the district lies along the sea coast and abounds in swamps and lagoons, and no works of reclamation have ever been undertaken. Of the 2,176 cases treated during the year the greater portion were relapses due to the fact that treatment was heretofore stopped so soon as the actual febrile symptoms had disappeared.

Syphilis.—Quite the average number of cases were seen, and no more grateful patients could be found than those of this class when it became known that labourers suffering from the disease would be supplied with medicines free of cost as an inducement to continue treatment over a prolonged period.

Yaws.—Fifty-three cases were seen, and many escaped observation owing to the careful manner in which some of the afflicted are secreted. Only a small proportion of these were sent to the Yaws Hospital, due to the limited accommodation at that institution, and of the latter, many of them discharged as cured suffered from relapses. I am of opinion that many of the cases are discharged too soon after the disappearance of the external manifestations of the disease owing to the great demand for room for other cases, and that such piecemeal efforts at treatment and isolation cannot be materially control its spread.

Pulmonary Tuberculosis.—No new case was recorded during the year 1915—a record in the medical history of the district.

Typhoid Fever.—Only one case was seen which, however, was an importation from one of the neighbouring colonies.

Dysentery.—The epidemic of this disease referred to in last year's annual report continued up to the end of March, and accounted for the majority of deaths recorded during the first quarter of the year. During this period 187 cases were treated. These, together with 481 seen during the last quarter of 1914, make a total of 668 cases treated during the epidemic.

Tetanus.—One case was seen, in a young but unhealthy adult, and proved fatal.

The sanitary condition was generally satisfactory. All defects detected were readily rectified by the offenders.

Under this heading I must express my conviction that a motor ambulance for conveying some of the sick poor from certain parts of the country districts to hospital is an absolute necessity. Not only will this be a great boon to the people, but with our improved and improving roads it will at once remove the necessity for district hospitals in a small island like this, and can be run at comparatively little cost. Under-staffed and badly equipped district hospitals can only serve the purpose of emergency hospitals, and do not justify their existence when easy transport can be made available. Centralization, even though an increase of accommodation and staff were necessary, would secure far greater hospital efficiency.

The attendances for vaccination continued quite regular, and 216 children under 1 year of age were vaccinated in addition to many adults.

W. A. D. Whiteman, *M.O., D.* 7.

District No. 8.

The population of St. Andrew's parish is 17,322, scattered over 34·69 square miles of mostly mountainous country.

About 2,000 persons are served by medical officers of districts to whom they are readily accessible.

The Registrar-General's returns in 1914 show both births and deaths in St. Andrew's parish outnumber any other in the island.

In the plains along the sea coast a large population resides, periodically attacked by malarial fever. The swamps about Telescope Estate are a special cause of illness to those in that neighbourhood.

The last quarter of the year was as usual the most unhealthy. The dysentery and illness in January was a continuance of the epidemic of dysentery that occurred during the latter months of 1914.

Diarrhœa which occurs from flies is more in evidence during the fly seasons.

February to May.—Cane matures, and when sugar is in process of manufacture flies are then very numerous.

May to July.—The mango comes into season, again flies swarm over the partially eaten fruit thrown down on the roads and around labourers' cottages.

August to September.—Indian corn ripens. This is the real fly season. It is hard work to keep flies off any food left uncovered on the table. Contaminated food (as well as improper food) is answerable for a good deal of the diarrhœa amongst the infants and children of the poorer classes.

Marasmus and other wasting diseases of infancy occur less frequently among the children of East Indian mothers, who nurse their babies longer and feed them less with the spoon.

I have searched in vain for the breeding places of flies which periodically occur in such numbers. The later months of the year are more unhealthy on account of the malaria than the periods when flies are prevalent.

Meteorological Conditions affecting Health.—The rainy season commences about May 24 and continues with violent downpours for about six weeks. Variable weather succeeds till about the end of September, when heavy showers again fall till the close of the year.

The dry season is from January to May. When the period of variable weather is interrupted by a few rain storms the fœcal bred pupæ of the fly are destroyed, the earth is purified of excrementitious matter, and the rivers flushed. In such a year dysentery does not become epidemic.

In 1914, when dysentery was epidemic, the rainfall at Mt. Horne was: July, 7·22; August, 6·74; September, 7·34; and in 1915 when no epidemic broke out: July, 11·39; August, 11·31; September, 9·01.

"The fly season" occurs during the same months, and no doubt the fly acts as a disseminator once dysentery breaks out, unless destroyed by the flooding of the ground.

Remarks on particular Diseases.

Malaria.—This assumed epidemic proportions in August and September. Amongst those living in malarious localties an attack several times in a year is not unusual and figures in the return of such cases; on the other hand, many do not seek medical advice unless very ill.

Typhoid.—Five cases occurred in the last two months of the year in St. Andrew's parish. All those infected were removed to the District Hospital for proper treatment and also isolation.

Tuberculosis.—Four fresh cases were notified.

Leprosy.—Two cases notified, both died during the year.

Yaws.—Forty-six cases reported.

Filariasis.—I believe a greater number of cases exist than is appreciated. There is hardly a village in which elephantiasis of the leg cannot be found.

General Sanitary Condition.—The rising generation from the schools may appreciate sanitation, but the adult is incredulous about the dangers of mosquitoes and will erect a dwelling without regard to the proximity of a swamp. Sunlight and air are quickly barred out with banana clumps. The soil is rendered damp with household slops thrown from the windows, flies alight on the greasy ground and then contaminate food. Night soil is buried too close to the house and embryonic hookworms infect the inmates.

Nuisances are only abated on notice and then repeated till another notice is served. A regulation prohibiting the washing of clothes in the streams except between certain hours should be enforced, in order to enable persons to more safely draw their house supply.

Schools.—The multiplication of schools has in the last few years brought them nearer to many children's homes. The distance must always remain considerable to the majority. Each child now carries a tin of food of a very simple nature to school. Each school should heat this food for the child. Coagulated grease, cold potato and peas is not a very appetizing or nutritious meal. If the children eat this mid-day meal warmed fewer would be absent from indisposition and sickness.

Colonial Medical Reports.—No. 71.—Grenada (*continued*).

The drainage scheme inaugurated by His Excellency Sir Jas. Sadler has effected much good to the health of those who are obliged to reside in the town. The District Board have concreted additional drains during the year, and fortnightly reports of the sanitary condition are made by the Sanitary Inspector. Though the town is now more healthy than formerly it has not yet earned a name for salubrity. A narrow slip of not very valuable cane cultivation stretches right across the middle of the town. No doubt its growth indirectly contributes to the ill-health of the inhabitants. The town is perpetually infested with flies attracted by the saccharine matter. The cane field drains, not easily viewed for more than a few yards, frequently hold water, breed mosquitoes, besides keeping the neighbourhood damp. Excreta, in spite of every vigilance, is deposited on the soil by night, and rats find food and concealment and safe resting place in the clumps of coco-nut trees.

Cane cultivation is, therefore, in my opinion, a very undesirable crop within the precincts of a town that is also a port of entry for foreign shipping.

The lymph supplied for vaccinations gave uniformly good results. Two hundred and two children were successfully vaccinated. The little operation is always deferred from month to month when delicate infants are brought, and this gives one additional control in watching over weaklings.

N. S. Durrant, *M.O., No. 8 Dis.*

District No. 9.

Prevailing Diseases.

There is no doubt that malarial fever is the commonest disease we have to treat, and it is within ascertained facts to say that in the villages of Soubise, Marquis, Hope, Munich and Harford's Village 90 per cent. of the population are infected with malaria.

The type most usually met with is the benign tertian, but the malignant type of the disease is not uncommon, the treatment of this latter condition in children brought moribund to the surgery is by no means a simple problem; perhaps the simplest line of treatment, and certainly the one that gives quickest and best results, is the rectal administration of a weak solution of quinine bihydrochlor.

This line of treatment was brought to my notice by the late Dr. Claude A. Hughes, who spoke in enthusiastic terms of the excellent results he obtained, and in those cases where I have tried it the results have exceeded my expectation; the procedure is very simple, viz.: A rubber catheter on the end of a 1-oz. glass syringe, the solution of 5-8 gr. in 1 oz. of water being given very slowly, its action appears to be infinitely quicker and more effective than the intramuscular injection.

Measures intended for the prevention of malarial fevers have not been undertaken; still, much might be achieved by the periodic oiling of these swamps, as also of the more frequent and smaller breeding places near to dwellings.

The recent decision to provide labourers ill with malarial fever with free medicines has certainly tended to a more prolonged course of quinine with its attendant advantages.

Syphilis and Yaws.—The tertiary manifestations of this disease are among the commonest of the chronic complaints we are called on to treat; sufferers from this disease receive free medicines.

Dysentery.—A great many cases of the bacillary type occurred. The treatment with castor oil gave uniformly good results.

Enteric Fever.—Several of these cases occurred in various parts of the district, and when possible were removed to the local hospital. On the subject of this complaint one can only reiterate the statement that to attempt to treat enteric fever in the house of a labourer or peasant is to condemn that patient to death, and expose the whole neighbourhood to the risk of an epidemic of typhoid fever. It is a gloomy outlook, therefore, when it is remembered that the accommodation at the District Hospital is inadequate to meet the ordinary needs.

On the whole the general sanitary condition is as satisfactory as circumstances will permit.

Dunbar Hughes.

District No. 10.

This district is made up of practically the whole of the parish of St. David's, and a fair portion of the adjoining parts of St. Andrew's.

In the parish of St. David's proper there were during the year 250 births. Of deaths of all ages 206, and of these forty-three were among those of 1 year old and under.

Of the "causes of death" certified dysentery was the most prominent among adults; and among children 2 years old and under gastro-enteric troubles and their sequelæ claimed the most victims. Debility as a result of malarial fevers contributed a fair share to the remainder of the general mortality.

The year 1915 may truthfully be said to have been the most unhealthy since I have been in charge of this district, now nearly thirteen years. There were during the year two epidemics, one of dysentery and the other of malarial fever.

The dysentery epidemic started in the month of August, and continued right on to the end of the year. The type was as virulent as that of 1914, the worst ever experienced in this district for about two decades. The most important feature to relate in connection with this year's epidemic is that the disease fought shy of all the villages visited by last year's epidemic, and was found principally in the parts unaffected by it last year. This peculiarity is worth noting in view of the prevailing theory of water pollution being its principal cause. It is most difficult to assign a satisfactory cause of origin to these epidemics. While I am willing to grant that water pollution might be the starting agent of the first few cases, or might be the source of infection in some cases, the real agent, in my opinion, responsible for the spreading of general infection resulting in true epidemics, such as what have been experienced in this colony during the last year and 1914, is the common house-fly.

As a matter of fact, when the fæcal discharges of a patient in a house are thoroughly disinfected and the bed pan, bedding and clothing used in the sick-room are thoroughly disinfected, thus keeping away the house-fly from resting and feeding on the discharges, it is the rarest thing for a second person, *cæteris paribus*, in such a house to get the disease, in spite of the universally admitted fact that all the other inmates use water from the same source and in the great majority of cases unboiled or otherwise unsterilized.

During the epidemic the diagnosis was always easy, but again, as in 1914, the treatment was largely empirical, that is to say, while some drugs acted like a charm in some cases they were powerless in others. There is no doubt that in the main the disease was bacillary in type with a few of the amœbic variety scattered between. A specific medicine for this bacillary type yet awaits a happy discoverer.

Malarial fevers assumed epidemic proportion in the month of August and lasted till end of November. These fevers were responsible for much sickness all along the sea-board where it is generally endemic. At the commencement of the epidemic His Excellency the Governor issued instructions granting quinine mixtures to labourers free of charge, and made it otherwise easy for planters to procure quinine from the Colony Drug Store for the use of their labourers; these concessions conferred a great deal of benefit on the sufferers among the labouring classes.

Yaws continues to be exceedingly prevalent in this district. Most of the cases were sent to the Yaws Hospital.

The end of the year saw the termination of the operations of the local branch of the Rockefeller Sanitary Commission in their campaign to eradicate ankylostomiasis in this district. From all appearances solid good work has been done, and it is to be hoped that hookworm disease, which was, however, never a serious complaint in this district, will for many a year to come remain a thing of the past.

After excluding the effects of the two epidemics already referred to, the general sanitary condition of the district was good.

Infants were brought up regularly for vaccination throughout the year by their mothers, and the lymph supply was regular and gave excellent results throughout.

G. N. Alexis, *M.O.*, 10 *Dis.*

Carriacou District.

Vital statistics for the year 1915: Population, 7,431; births, 247; deaths, 68; birth-rate per 1,000, 33·2; death-rate per 1,000, 9·15; still-births, 14.

Apart from a limited number of cases of enteric fever, this year has been a very healthy one. The number of deaths were almost half as many as in the preceding year.

A point of interest is the increase in the number of still-births, the cause of the majority being syphilis, which disease, usually contracted abroad, is transmitted to the innocent of this island. Some drastic measure should be adopted to prevent its ravages as is seen in other islands, in one of which it causes almost as many deaths as diarrhœal diseases of children.

Sanitary Condition.—At the time of the outbreak of enteric fever only one pond in the whole island was enclosed, so that all animals had easy access to the drinking water, which was in a state of continuous pollution, as was shown by analysis.

Almost all the ponds have now been enclosed and the wells cleaned and purified. The latter should be improved by having pumps fixed on. In various parts of the island are several cisterns which should be used for providing the people with better drinking water.

I have never been able to collect any larvæ from the ponds, which are probably unsuitable for the mosquito on account of the large amount of suspended matter and the algæ which often covers the entire surface of the pond with a green film.

Two diseases commonly seen in Carriacou are cirrhosis of liver and endemic goitre. I am inclined to attribute the cause to the large amount of toxins contained in their drinking water, which toxins are all the more easily absorbed when alcohol is drunk.

Two hundred and twenty-one vaccinations were done during the year. The lymph being quite satisfactory.

Ankylostomiasis.—Severe infections are seldom seen. Carriacou is a comparatively dry island and the type of cultivation is inimical to the ankylostome, for the annual crops of cotton and corn demand a complete yearly exposure of the surface of the land to the intense rays of the sun, conditions different to those which obtain on a cocoa and nutmeg cultivation.

Sickness at Different Seasons.—From a small valley at Windward nine cases of enteric fever originated. Of these there were two deaths, one of which took place the day after the patient was seen from a concurrent double pneumonia. Sewerage is thrown about indiscriminately, and the suspicious focus of infection was probably the well, which, situated in a drain at the lower end of the valley, receives the drainage from the houses above and around it. A leak was subsequently found in the wall of the well.

The large percentage of saprophytic bacteria contained in pond water is probably inimical to the growth of typhoid bacilli.

A point of interest in the treatment of this disease was the control of rather severe intestinal hæmorrhages by means of emetine.

Remarks on Particular Diseases.

Malaria.—118 cases were seen during the year. The majority yielded quite readily to quinine. A method of quinine administration which I have found very useful when the drug cannot be taken by the mouth is in solution *per rectum*.

Tuberculosis.—"In large centres of population few individuals arrive at maturity without at some time of their existence harbouring the ubiquitous tubercle bacillus." Nine cases of the disease in its several stages were seen during the year. On account of a better hygienic condition and a more prosperous state this scourge is not as frequently seen as in Grenada. The labourer is unaware of, and so neglects, the early premonitory symptoms of this insidious disease, and is therefore seen by the physician when the condition is far advanced. To wait for a diagnosis to be made from physical examination and the microscope is to wait till it is usually too late to admit of a cure in an individual whose racial resistance is already low.

DUNBAR HUGHES.

Colonial Medical Reports.—No. 72.—Nigeria—The Northern and Southern Provinces.

MEDICAL AND SANITARY REPORT FOR THE YEAR 1915.

NORTHERN PROVINCES.

THE health of Europeans generally, in comparison with former years, may be regarded as satisfactory.

Deaths during the year were due to blackwater fever, yellow fever, enteric fever, dysentery, malaria, chronic rheumatism, and other diseases.

GENERAL EUROPEAN POPULATION.

The average number of Europeans resident in the Northern Provinces during 1915 was 897, as follows:—

Government officials	507
Trading firms	178
Mining companies	128
Missions	84
	897

The native population is estimated at 9,500,000, which is the same figure as last year.

Reliable statistics of births and deaths are not yet obtainable.

The diseases for which Europeans mainly were treated were malaria, dysentery, blackwater fever, and diseases of the digestive system.

Generally speaking, the health has been fair.

One fatal case of yellow fever occurred during the year in a European of the Public Works Department at Kaduna.

This is the second case of yellow fever so far reported from the Northern Provinces, and every precaution was taken to prevent its spread.

TABLE SHOWING THE SICK, INVALIDING, AND DEATH RATES OF EUROPEAN OFFICIALS.

	1915.
Total number of European officials resident	761
Average number resident	507
Total number on the sick list	785
Total number of days on the sick list	4,699
Average daily number on the sick list	12·8
Percentage of sick to average number resident	2·5
Average number of days on the sick list to each patient	5·9
Average sick time to each resident	9·2
Total number invalided	20
Percentage of invalidings to total number resident	2·6
Percentage of invalidings to average number resident	3·9
Total number of deaths	7
Percentage of deaths to total number resident	92
Percentage of deaths to average number resident	1·4

INVALIDING OF EUROPEANS.

Cause	Officials	Non-officials
Malaria tertian,	—	1
Malaria, æstivo-autumnal	—	2
Blackwater fever	3	4
Rheumatic	1	—
Anæmia	1	3
Other diseases	6	1
Neuritis	1	1
Laryngitis	—	1
Gastritis	1	—
Dyspepsia	1	—
Appendicitis	1	—
Colitis	1	—
Lymphangitis	1	—
Abscess	—	1
Injuries (General)	2	—
,, (Local)	1	—
Total	20	14

TABLE SHOWING THE SICK, INVALIDING, AND DEATH RATES OF NATIVE OFFICIALS.

Total number of Native officials resident	802
Average number resident	594
Total number on the sick list	850
Total number of days on the sick list	3,903
Average daily number on the sick list	10·7
Percentage of sick to average number resident	1·8
Average number of days on the sick list to each patient	4·6
Average sick time to each resident	6·5
Total number invalided	3
Percentage of invalidings to total number resident	·37
Percentage of invalidings to average number resident	·5
Total number of deaths	7
Percentage of deaths to total number resident	·8
Percentage of deaths to average number resident	1·2

SANITATION.

The sanitary programme for 1915 was not an ambitious one, five months of "status belli" having proved "carpe diem" to be sound philosophy in the absence of peace.

The number of officers, lay as well as medical, upon whose activities the promotion of much sanitary progress and efficiency had normally depended, seconded for military duty exclusively, kept increasing, while the two sanitary officers were obliged to divert a large proportion of their energy from sanitary to purely medical duty.

Fortunately, visitations of epidemic disease were not a prominent feature of the year.

The second case of yellow fever, recorded in the history of the Northern Provinces, constituted its most notable event. Energetic measures, which shall be described later, were promptly enforced to prevent the spreading of the disease, and they seemed to be attended by success, for no other case was noted.

With the end of the year it had become necessary to recognize enteric fever and tuberculosis as naturalized members of the endemic community, for it was no longer either truthful or possible to regard examples of them as isolated importations.

The tsetse-fly-infected River Benue, particularly along its course through the Province of Muri, received careful personal attention from the sanitary officer. He sought the co-operation of the political officers concerned, and their response was cordial and effective.

The Provinces of Bassa, Muri, Yola, Bauchi, Bornu, Kano, Nassarawa, Zaria, and Niger received the personal attention of the sanitary officers while they were on tour; local conditions, which could not be effectively dealt with at the time, were noted for subsequent attention; and the interest and assistance of several of the Emirs and of numerous District Headmen were enlisted in the cause of sanitary progress.

The opening up of trunk roads and the maintenance of existing ones, especially in the regions infested by tsetse-fly, was affected, so far as the narrow means available would permit. The principle of maintaining broad cleared roads—in the interest of the public health apart from economic reasons—had become a fixed one among practically all those whose activities were of any account.

All the riparian stations along the River Benue were visited by the Senior Sanitary Officer and an Officer of the Surveys Department.

The lay-out of each station was carefully gone into on the spot, and all the data necessary for embodiment in the plan were noted. Those stations were visited while the river was in flood, it being quite impossible, during the dry season, to recognize the essential features of riparian settlements.

The attenuation of the medical staff had rendered it necessary for such medical officers as happened to be employed locally on civil duty to travel much more extensively than had been necessary under normal conditions.

The attenuated medical staff, naturally, failed to to maintain progress in vaccination and in leper segregation. This attenuation of the staff also rendered it necessary to postpone, until the advent of better times, the carrying out of the *ante bellum* scheme of extending the dispensaries financed by various native administrations. This is not an exclusively medical question, for such dispensaries are quite as much centres of sanitary enlightenment as of medical service.

The more important stations throughout the country were well maintained, so far as sanitary routine was concerned. Those stations normally enjoying the services of medical officers, from which such officers had been withdrawn, received from other officers a generous amount of sanitary attention, and how little their sanitary routine suffered was agreeably surprising. In the course of his travelling the Senior Sanitary Officer visited several stations, in which the busy political officers were only occasionally resident, merely using them as their headquarters, and he was impressed by the creditable maintenance of sanitary routine thereat.

From time to time a certain amount of trouble arose at certain stations due to nuisances incidental to the carrying on of offensive trades, especially fellmongering. It was recognized that the conditions were exceptional and, happily, only temporary, and it was tacitly agreed that so long as such nuisances were not actually dangerous to the public health academically correct proceedings against them should not be undertaken vexatiously. This seemed to be common sense; the traders concerned were quite willing to abate all nuisance so soon as the Government should be able to grant them the necessary facilities—new sites with requisite railway siding accommodation, &c.—for which they were prepared to pay. The trades concerned were bringing considerable wealth into the country, a factor of the first importance under existing conditions; and it was felt that it was just as necessary to endure inconvenience for the public good as it was to abolish dangerous nuisances, at all costs, in the interest of the public health. The traders, however, were left under no delusion; they were made clearly to understand that the Government would stop their operations summarily in the event of the medical authorities declaring them to be dangerous to health.

Cattle plague appeared in several parts of the country, particularly at the top of the Benue. This was, of course, taken under the supervision of the Veterinary Branch of the Department of Agriculture. But the principal medical officer deemed it wise to enter his caveat against the transport of live-stock along the Benue by steamer; while steps were taken, at various centres, to prevent the exposure for sale as food of the carcases of diseased animals.

No new sanitary legislation was enacted during the year; but fresh legislation was suggested and submitted for the consideration of His Excellency, and the end of the year saw the new Public Health Ordinance within sight of completion.

With the end of the year the distribution of water by pipes was being effected, more or less partially, at Zaria, Kaduna, Kaduna Bridge, Minna, Baro, and Lokoja.

During the rainy season the fronts of many of the riparian villages in the Province of Muri were kept entirely cleared; and the danger of the villages being attended by tsetse-fly, during their movements to and from the necessary water, was thus materially diminished. The opening up of trunk roads and the maintenance of existing ones, mentioned above, was very substantial progress, considering the narrowness of the means, financial and personal, available for the purpose. In this connection, the work maintained in the backward provinces of Bassa and of Muri is especially worthy of mention.

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The laying down of dhub grass was extended at various stations, and the Director of Agriculture arranged to distribute improved seed for this purpose throughout the country.

Considerable progress was made at various native towns in the direction of the safeguarding of water supplies, the extension of the use of properly constructed salgas, and in keeping the latter at an adequate distance from the former.

At the new capital progress, due to the piping of water, was achieved in the disappearance of guinea worm and of dysentery among the labourers employed there.

As the result of the tour of the Benue, plans of all the riparian stations along that river were prepared by the Department of Surveys; and the suggested lay-out of each station concerned was submitted to His Excellency the Governor-General, for his consideration.

In those suggested layings-out, all the canons of tropical hygiene were faithfully adhered to. This necessarily made the problem as a whole a very difficult one, for the riparian conditions were peculiar. The areas involved were often exceedingly limited; various interests, sometimes conflicting, had to be studied; and the squaring of sanitary necessity with political and economic expediency was and remains a very puzzling question to settle, but it is on the way to being settled.

Several important landward stations were similarly dealt with, and the problems raised by them were comparatively simple.

The observations made and recorded by the Sanitary Officer touching the incidence of trypanosomiasis along the Benue and the method of inoculation against small-pox practised by certain natives in that region were careful and helpful, and constituted a valuable addition to the sanitary archives of the Northern Provinces.

The principle of protecting meat offered for sale by wire-gauze screens or cages was extended, and the Department of Public Works did much good service in this direction by supplying butchers with such appliances at reasonable cost.

The active inspection of animals for slaughter was extended; much was done in the way of curtailing the activities of the small amateur wayside butcher. The question of putting the business of the butchers on a more restricted and less questionable footing was brought under serious consideration, and this was rendered less difficult by the rearrangement of numerous markets.

Of course, the inspection mentioned here was restricted to places inhabited by Europeans. Much of it was conducted by amateurs, but the grosser abuses were eliminated, and a really substantial beginning was made.

In several places leading natives expressed alarm at the attenuation of the medical staff on the ground that they would not be able to get the children vaccinated. This was a case of "the mountain coming to Mohammed," and marked the most striking evidence of progress.

When yellow fever visited Kaduna in the autumn the local Political Officer brought the District Headman, together with his leading henchmen, to visit the medical and sanitary officers concerned.

It was pointed out to those natives that yellow fever was a disease imported from the coast; that it was conveyed by the mosquito; that it was deadly to the European, and, most likely, equally deadly to our indigenous native friends; that extensive clearing of grass and bush and the other means of eliminating mosquitoes from around human habitations were the only means of warding off and killing the disease; that the Europeans had already begun to effect this round their quarters and the quarters under their control; and that they, the indigenous natives, would be well advised if they imitated the Europeans.

The District Headman and his henchmen expressed their thanks for the information. They quietly departed, and within a week had effected clearing operations around their quarters at the equivalent of a cost of between £200 and £300.

MALARIAL YELLOW FEVER AND FILARIASIS.

The preventive measures described in former reports were maintained so far as this was possible.

Practically all Europeans in the Government service were provided with so-called mosquito-proof rooms. In many cases tar was supplied to Europeans occupying mud huts with mud floors in order that they might be able to protect the wooden frames of their mosquito-proof rooms against the ravages of white ants.

The Public Works Department held a stock of those rooms in reserve against emergencies, together with adequate material to add liberally to the number of them. The benefit of this arrangement was seen when yellow fever declared itself at Kaduna. All second-class officials, travelling or for any other reason not provided with mosquito-proof rooms, were provided with mosquito nets, and the administration is doing all that it can to induce the trading firms to secure the same protection for their European employees.

When yellow fever occurred at the site of the new capital at Kaduna in October all the local precautions were taken at once; the entire district was put in quarantine; the local railway stations, together with the two adjacent ones, up-line and down-line respectively, were closed to incoming and outgoing passengers; bookings to those stations were discontinued throughout the entire railway system; and guards were stationed on the native trade routes to prevent ingress and egress.

Extensive clearing and other operations were immediately undertaken, and it is pleasing to report that the members of the European community cooperated cheerfully and energetically with the medical officers concerned. Fortunately, the outbreak was confined to the one fatal case—a European one.

It may be wise to record in this report, once for all, the simple fact that the members of the medical profession in West Africa are quite aware that the

Return of Diseases and Deaths (European) in 1915 in the Northern and Southern Provinces of Nigeria.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	4	2	4
Anæmia	32	—	23
Anthrax	—	—	—
Beriberi	—		
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	—	—	—
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	1	—	1
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	22	1	31
Enteric Fever	4	1	4
Erysipelas	—	—	-
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	1	—	1
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	—	—	—
Kalar-Azar	—	—	
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	—	—	—
Malarial Fever—	55	4	116
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	71	1	77
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	—	—	—
(d) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	—	—	—
Other Diseases	206	4	208
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	5	—	7
Rheumatism	12	1	17
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	2	—	4
(b) Secondary	2	—	2
(c) Tertiary	—	—	—
(d) Congenital	—	—	—
Tetanus	—	—	—
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	1	—	1
(c) Lupus	—	—	—

General Diseases—*continued.*	Admissions	Deaths	Total Cases Treated
(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping Cough	—	—	—
Yaws	—	—	—
Yellow Fever	1	1	1

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	17	—	18
Circulatory System	8	3	8
(a) Valvular Disease of Heart	—	—	—
(b) Other Diseases	—	—	—
Digestive System—	—	—	—
(a) Diarrhœa	15	—	15
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	6	—	6
Congestion of Liver	—	—	—
(d) Abscess of Liver	5	1	5
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	7	—	7
(g) Cirrhosis of Liver	—	—	—
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	81	—	82
Ear	4	—	13
Eye	6	—	6
Generative System—	—	—	—
Male Organs	7	—	7
Female Organs	3	—	3
Lymphatic System	10	—	10
Mental Diseases	4	—	4
Nervous System	18	1	41
Nose	—	—	—
Organs of Locomotion	9	1	11
Respiratory System	11	—	11
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	5	1	5
(f) Other Diseases	24	—	28
Urinary System	6	1	6
Injuries, General, Local—	50	2	51
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	1	—	1
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	1	—	1
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	6	—	6
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	—
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

Stegomyia fasciata is the carrier of yellow fever, that *Stegomyia fasciata* is a domestic mosquito, and can be kept down by keeping a four hundred yard zone round every habitation cleared and free of standing water and of water-containable receptacles, and that if this be thoroughly done yellow fever can be kept at bay. The use of the mosquito-net continues to extend among various sections of the non-European community; so also does the taking of quinine; and the voluntary submission of themselves to medical advice and treatment increases among the members of the indigenous native population.

In these days of free and extending railway communication, and in light of recent experience, sporadic cases of yellow fever are quite likely to be found in the Northern Provinces now and again during the rainy season, but they will all be importations from the south, as it is impossible for any strain of yellow fever parasites to maintain its existence for a round year in these provinces.

The methods of mosquito prevention are well known; they are all practised, and, since the case of yellow fever at Jebba in 1914, the *Stegomyia fasciata* in particular has been harried constantly.

TRYPANOSOMIASIS.

No case of this disease was recorded in a European during the year, although the River Benue had been used extensively for passenger transport. One of the European victims reported the previous year returned to duty convalescent.

The vessels used for passenger transport were all fitted with more or less effective wire-gauze shelters. It is necessary to so qualify the protection because it was seldom perfect, as was bound to be the case under the conditions on which the vessels had to be used.

On the navigable rivers vessels have to be used for the transport of cargo as well as passengers. The vessels have to be worked, and they are not flush-decked; the crews are not European; sheets of wire gauze are not steel plate, and a certain amount of rupture of the flimsy protecting gauze is inevitable.

Clearing operations are always being effected in tsetse belts, so far as funds and other means will allow. Where there are alternative routes the use of those traversing fly-belts is consistently discouraged. Constant efforts—increasingly successful—are being made to induce natives permanently to desert foci of sleeping sickness, and Government is gradually adopting the policy of refusing to permit Europeans to settle in regions from which it is trying to induce the indigenous natives to depart.

But it must be remembered that operations against trypanosomiasis are a constant war, in which the enemy is apt, unexpectedly, to change his venue from time to time; and, in this war, surprise attacks of trypanosomiasis will probably always be unpreventable.

EPIDEMIC DISEASES.

Cerebrospinal Meningitis.—Outbreaks of this disease have always been patchy in their incidence. When they are recognized they are always isolated in special camps of grass huts, and the grass huts are burnt at the end of the outbreak concerned.

But the patchiness of its incidence makes it a fair inference that numerous isolated outbreaks occur beyond the ken of the European, for medical officers are few and far between in those regions where the disease is most likely to occur, and prolonged acquaintance with the natives, and consequent increasing information elicited from them, makes the observer incline to believe that this inference is a correct one.

Pneumonia and Influenza.—These diseases almost invariably assume the epidemic form. As reported on former occasions, their prevention is conditioned by progressive change in the domestic habits of the natives, which can only be the result of education.

Pyrexia of Uncertain Origin.—A certain number of cases is always being returned under this heading. The designation is a confession of ignorance, and, until this veil of ignorance shall have been lifted, it will be impossible for sanitary officers to call them endemic or epidemic, or to suggest any methods of prevention.

ENDEMIC DISEASES.

Enteric Fever.—It is unhappily necessary to number enteric fever with the endemic diseases of the Northern Provinces. There never has been a great outbreak of it anywhere, and had it been at all common among the natives it would have been recognized long ago. But now that there have been several cases among Europeans and it has appeared among natives, it has evidently come to stay. It is well-nigh certain that it was originally imported by Europeans, and that a number of native carriers have consequently developed since.

This is not surprising when the personal habits of native house-boys are remembered. In the event of a European—particularly an isolated one, and there are many such—being attacked by the disease while inhabiting a dusty mud hut in the bush, he must be attended by his house-boys, and the weaker he becomes the more intimately and constantly must he be so attended. Such house-boys are bound to become carriers sooner or later.

The indigenous native seems to be less susceptible to intestinal disease than is the average European, and this probably explains why native outbreaks have not attended every European case.

Fortunately, preventive methods are and always have been practised at every European centre, the prevalence of dysentery being responsible for this.

As mentioned in former reports, the average European will never be induced to abandon the consumption of salads, and thus one of the best means of prevention will not be employed. That being so, it would be wise were all young men coming out to the Northern Provinces for the first time obliged to submit to anti-typhoid inoculation before leaving home, just as in the case of vaccination. They are the most susceptible, and, with very few exceptions, are likely to be posted to stations in the bush remote from hospitals on their first arrival.

In the dusty, wind-swept north, a very obvious means of prevention, in addition to the routine methods, is to furnish each European with a compound sufficiently large in area to be self-contained, so far as sanitation goes, in order that the transport of latrine buckets through the station may be avoided. This is now under consideration.

Dysentery, like small-pox, is an endemic disease which frequently assumes the epidemic form.

The routine practice was steadily carried on throughout the year where there was European supervision available.

Small-pox.—The effect of the attenuation of the medical staff was marked in the case of vaccinations. 10,612 vaccinations, 6,884 of which were successful, were performed in 1915; while in 1914, 17,504 had been performed with 13,975 successes. Nor was the work in 1915, so far as it went, so successful as that in 1914, for in 1915 there were 3,728 unsuccessful vaccinations, while in 1914 there had only been 3,529 failures. The higher pressure at which the men available had been working probably accounted for this. This was very disappointing, as vaccination had been progressing so satisfactorily before the advent of war; but it may turn out to have been a blessing in disguise, for the less easily a thing sought for is obtainable, the more highly is it likely to be valued.

Little can be done to prevent tetanus, because its chief incidence is among those natives who do not seek medical treatment for their wounds and injuries.

The prevention of rheumatism can only be effected by a revolution in the habits and customs of the natives.

The prevention of tuberculosis is quite as difficult as is that of influenza and pneumonia. Here, as in so many other cases, education alone can be of real efficacy.

Venereal Diseases.—This section continues to receive constant attention. The principle of having the market and the caravansary outside of each new town is steadily followed, and in various regions the natives of old-established towns are making the change voluntarily.

Most of the pagan natives remain free from these diseases, and they are always encouraged to preserve their aloofness from the non-pagan peoples, so far as everything but trade is concerned. Educational efforts against the spread of venereal diseases are in constant practice.

It may be that, when the normal routine shall have been completely re-established after the War, it may be possible to render many syphilitics non-infective by greatly extending the use of salvarsan; but too much must not be expected from this, for there will be a perpetual stream of imported infection from without the Nigerian borders.

HELMINTHIC DISEASES.

Ankylostomiasis.—Constant efforts are made against this disease. It is carefully looked for and treated in the native hospitals and in the prisons, and every endeavour possible is made to reform the sanitary habits of the natives in those regions in which it is prevalent.

Unfortunately, during the year under review, the worst foci of the disease happened to be in those regions in which the endemic activities of medical and sanitary officers had to be suspended. The advent of war found, and very materially crippled, an effective crusade against the disease. Although there is much ankylostomiasis in the Northern Provinces, practically no European station can be called a focus of the disease, and this furnishes fairly good evidence of the efficiency of the sanitary arrangements at Government stations.

The general introduction and adoption of the salga at places where it has not, so far, been in universal use: everything is being done where possible to encourage this, which is by far the best preventive measure.

Bilharzia.—Invasion by this parasite is seldom or never observed among the members of the European community, although it is noted among the natives in various localities.

Although the Europeans very rarely bathe in the rivers, they seldom or never bathe in sterilized water exclusively, and this fact makes the observer sceptical when the skin is alleged to constitute an avenue of admission to the parasite. It is impossible to say whether one sex suffers more than does the other from this particular invasion, because native women seek medical aid to a far smaller extent than do their men.

So far, the only preventive measures employed have been the routine safeguarding of water supplies and the endeavour to induce the natives to "cook" their drinking water.

Prevention of guinea worm is entirely covered by what is done in the safeguarding of water supplies.

The increasing supervision of markets in general, and the more thorough inspection of meat and regulation of butchers in particular, must in time have a perceptible effect in the prevention of invasion by entozoa.

GENERAL MEASURES.

Sewage Disposal.—During the year the arrangements worked well at all stations which had not been deserted, and in some stations they worked abnormally well, because there was less work to do and because a large number of those, the catering for whose requirements normally called for most supervision, were temporarily absent.

It may be wise, however, even at the risk of weary reiteration, to dwell briefly on the comparative merits of salgas and latrine buckets. As has been stated before, salgas are quite unsuitable for regions where the sub-soil water approaches the surface within 8 ft., unless in such regions embankments be thrown up and the salgas dug in the centres of the embankments. But in regions where the sub-soil water lies more than 8 ft. below the surface, the salga is head and shoulders above the latrine bucket in sanitary efficiency.

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It requires far more latrine buckets than salgas to provide for a given number of people. This means that a latrine bucket system affords far more open mouths for the ingress and egress of flies than does a salga system; and, moreover, buckets have larger openings than have salgas. In addition to this, salgas are more often darkened than are latrine buckets. Where the people are negligent and careless, as they generally are, offensive salgas can be attended to by less labour than is necessary in the case of offensive buckets, and salgas do not necessitate the transport of excrement along the public thoroughfares.

Disposal of Refuse.—The methods already recorded worked well. Additional incinerators were erected at various places.

Water Supply.—The only new fact to record here is that, by the end of the year, water had been laid on to Minna by pipe from the River Bako, and it constituted an improvement as necessary as it was welcome.

There is nothing new to be reported concerning drainage.

Clearance of Bush, Undergrowth, &c.—Except at Kaduna, on account of yellow fever, and along the upper Benue, on account of trypanosomiasis, less bush clearing was done directly by Government than had been done for some years before, *imprimis*, because certain stations were temporarily deserted; *in secundis*, because economy had become a paramount necessity.

In landward places under the native administrations as much clearing as ever was effected, and even more in some regions.

MEASURES TAKEN TO SPREAD KNOWLEDGE OF HYGIENE AND SANITATION.

During the year the local instruction given by political, medical and sanitary officers was continued so far as possible. The Sanitary Officer had special conferences with various pagan chiefs and their henchmen, and the Senior Sanitary Officer had similar conferences with one Sultan and three Emirs.

Apart from routine teaching by members of the staffs of the Government schools, no hygiene was taught during the year.

Towards the end of the year one well-born young Mallam—it is hoped the first of a series of such men—was attached to the sanitary branch, to be trained as a sanitary inspector.

It is hoped that, a few years hence, each considerable native administration throughout the country will number among its officers a qualified sanitary inspector, who, being well born, well qualified and accepted by the people as such and as one of themselves, will be able to introduce sanitary reform and maintain it, and in doing so will secure the co-operation—instead of the passive resistance—of the natives.

It must be understood that those Mallams—native scholars—are ex-pupils of the Government schools, and are appointed Apprentice Sanitary Inspectors only after having received a nomination from the Director of Education.

FUTURE WORK.

The conquest of Cameroons has released numerous medical officers from trans-frontier service, but the medical staff will probably be kept attenuated until the end of the War, through a proportion of its members being lent for military service in Europe. This being so, much of what was formerly called arrears must now be numbered with problems of the future, to be tackled when the times will permit.

The attenuation of the political is not likely to be relatively so great as that of the medical staff, and there is a hopeful prospect of the sanitary officers being able to resume the normal extension of their activities in their landward fields of action.

(Signed) M. CAMERON BLAIR,
Senior Sanitary Officer.

METEOROLOGY.

The meteorology records in the Northern Provinces are incomplete, owing to the withdrawal of medical officers for duty on the Cameroons Expedition.

Except at Yola and Birnin-Kebbi, the rainfall during 1915 was considerably in excess of that in 1914 at all other stations.

The following are figures of interest:—

	Reading	Date	Station
Highest shade temperature	114	April	Maiduguri
Lowest shade temperature	46	Dec.	Zaria
Highest mean temperature	98·1	,,	Birnin-Kebbi
Lowest mean temperature	53·1	,,	Naraguta
Maximum total rainfall	61·91	,,	Naraguta
Minimum total rainfall	14·46	,,	Birnin-Kebbi
Maximum rainfall on one day	4·40	,,	Zungeru
Greatest range of temperature	55	,,	Kano
Highest mean relative humidity	90	July	Zungeru
Lowest mean relative humidity	22	Nov.	Kano

HOSPITALS AND DISPENSARIES.

Zungeru hospital contains three wards: two small, containing two beds each, and one large general ward of four beds.

In each of the small wards there is a mosquito-proof movable house, 9 ft. by 7 ft. by 7 ft., and in the larger ward three of the same size—only to this extent is there mosquito proofing.

Native hospital consists of two long buildings, previously built as a slaves' home and three other small buildings, one being used as a clerks' hospital. There are two mosquito cages for the isolation of suspected cases of yellow fever.

Lokoja Hospital contains six large wards of two beds in each, one bed in each ward being placed in a mosquito-proof house 9 ft. by 7 ft. by 7 ft. This is the only mosquito proofing in the building.

Native hospital consists of two large buildings, a portion of one being reserved for the treatment of women.

There are two mosquito houses for the isolation of suspicious cases of fever.

Kaduna Hospital.—The present temporary hospital at Kaduna Junction has not proved very

Return of Diseases and Deaths (Native) in 1915 in the Northern and Southern Provinces of Nigeria.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	4	—	4
Anæmia	141	10	157
Anthrax	—	—	—
Beriberi	34	14	44
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	1,103	2	1,129
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	—	—	—
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	1	—	1
Diphtheria	2	1	2
Dysentery	967	178	991
Enteric Fever	—	—	—
Erysipelas	3	2	3
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	801	1	832
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	1	—	1
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	11	3	25
(*b*) Anæsthetic	11	—	47
(c) Mixed	—	—	—
Malarial Fever—	—	—	—
(*a*) Intermittent	—	—	—
Quoidian	—	—	—
Tertian	401	6	408
Quartan	1	—	1
Irregular	43	5	43
Type undiagnosed	—	—	—
(*b*) Remittent	—	—	—
(c) Pernicious	—	—	—
(*d*) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	12	—	12
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	—	—	—
Other Diseases	808	70	926
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	21	1	21
Rheumatism	392	5	400
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	23	20	24
Sleeping Sickness	5	2	75
Sloughing Phagedæna	—	—	—
Small-pox	21	8	22
Syphilis	—	—	—
(*a*) Primary	91	1	94
(*b*) Secondary	134	1	136
(c) Tertiary	—	—	—
(*d*) Congenital	4	1	4
Tetanus	29	11	29
Trypanosoma Fever	—	—	—
Tubercle—	7	5	7
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	71	37	84
(c) Lupus	—	—	—
General Diseases—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	14	—	15
Yaws	4	—	4
Yellow Fever	14	3	14

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	736	16	766
Circulatory System	—	—	—
(*a*) Valvular Disease of Heart	45	10	52
(*b*) Other Diseases	63	23	67
Digestive System—	—	—	—
(*a*) Diarrhœa	620	55	653
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	19	2	21
Congestion of Liver	—	—	—
(*d*) Abscess of Liver	5	3	8
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	17	1	17
(*g*) Cirrhosis of Liver	6	5	9
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	1	—	1
(*j*) Other Diseases	660	62	688
Ear	32	1	32
Eye	164	—	171
Generative System—	—	—	—
Male Organs	319	—	335
Female Organs	70	4	72
Lymphatic System	237	—	246
Mental Diseases	38	17	95
Nervous System	137	23	149
Nose	5	—	5
Organs of Locomotion	200	4	217
Respiratory System	648	63	681
Skin—	—	—	—
(*a*) Scabies	4	—	5
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	18	—	19
(*d*) Favus	—	—	—
(*e*) Eczema	34	—	38
(*f*) Other Diseases	703	14	789
Urinary System	113	22	120
Injuries, General, Local—	1,605	60	1,666
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	426	—	442
Ascaris lumbricoides	23	—	25
Oxyuris vermicularis	2	—	2
Dochmius duodenalis, or Ankylostoma duodenale	442	77	463
Filaria medinensis (Guinea-worm)	7	—	9
Tape-worm	138	—	140
Poisons—	12	2	12
Snake-bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	1,182	29	1,187
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	—	—	—
(*b*) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

suitable, and it is proposed, during next year, to convert one of the new larger type houses at the new capital into a hospital to accommodate eight patients.

The native hospital is of a temporary nature.

Kano European Hospital was opened in August, 1915, the number of patients admitted to the end of the year being 47, 21 official, and 26 non-official. Out-patients 145, the majority of the cases being malaria.

VACCINATION RETURN FOR THE YEAR.

Station	Number vaccinated	Number successful	Number failed
Zungeru	345	289	56
Lokoja	2,473	1,415	1,058
Kaduna	167	100	67
Kano	771	617	154
Yola	432	234	198
Zaria	312	144	168
Bauchi	863	709	154
Ilorin	53	—	53
Sokoto	2,510	1,859	651
Maiduguri	1,267	963	304
Birnin-Kebbi	201	73	128
Naraguta	95	36	59
Minna	608	123	485
Ibi	49	9	40
Jebba	94	81	13
Offa	300	220	80
Katsena	72	12	60
Totals	10,612	6,884	3,728
Percentage...	—	6·50	35·0

GENERAL REMARKS.

The general health of only a small portion of the whole community really comes under observation. With this kept well in mind it is possible to say that the general health has been much the same as in former years. Registration of births and deaths is compulsory in Lagos and Ebute Metta only, and even in these places but a comparatively few of the cases registered are ever seen by a qualified medical man.

In spite of the War and the general dislocation of work, the returns show a considerably larger number of native cases treated than in the previous year. This increase, I think, must be ascribed to an increased appreciation of, and confidence in, European methods of treatment.

The total deaths among natives was 760, an increase of 221 over 1914.

The number of Europeans treated was fewer by 1,165 than in the previous year. This can probably be accounted for by the withdrawal of medical officers from several stations and by the large emigration of the European population to the Cameroons.

To some extent sickness of every kind, excepting small-pox and chicken-pox, is increased and intensified during the rains, but notably dysentery and rheumatism, and to a certain extent also bronchitis. Rheumatism is largely gonorrhœal in origin, and as such is to be found all the year round. Bronchitis is common in the Harmattan. Pneumonia is most prevalent during the first three months of the year, though it mainly occurs in January, when the Harmattan becomes pronounced. Malaria is also a disease of seasonal variation, and while more prevalent in the wet than in the dry season, its periods of greatest incidence are at the commencement and conclusion of the rains.

The most universally prevalent general diseases are chronic rheumatism and anæmia. Diseases such as diabetes, exophthalmic goitre, gout, leucocythæmia, myxœdema, &c., are extremely rare.

COMMUNICABLE DISEASES.

Insect-borne.—The principal insect-borne diseases that have come under observation are malaria and yellow fever. The number of cases of malaria treated has been greater. Yellow fever, though endemic, is fortunately not very commonly seen. There were during the years seven cases at Onitsha, with one death, two fatal cases at Forcados, five mild cases at Degema, and one fatal case at Akassa, which was only diagnosed post-mortem. All were natives, no case having been observed in a European.

Blackwater Fever.—Eleven cases in Europeans were treated, of whom two died. This disease shows a steady decline, both in incidence and mortality, during the last seven years (except in 1910, when there was a slight rise), and this in spite of the fact that the European population has increased at a rapid rate. This decline follows very closely the malaria fever curve. There occurred seven cases of blackwater fever in natives; only one of these cases, however, was an actual native of the country, the remaining six being either Syrians or West Indians.

Infectious and Epidemic.—The only epidemic recorded was one of chicken-pox, and was of a very mild type. Epidemics of small-pox and chicken-pox are more common in the dry season, usually disappearing with the onset of the rains.

Dysentery is worthy of some special mention, because of its high rate of incidence and case mortality. The incidence of this disease throughout the Southern Provinces was 13·8 per 1,000, while the deaths from this disease amounted to 18 per cent. of the total deaths from all causes.

Thirty-three cases of beriberi were treated, with thirteen deaths. All were natives in the Cross River districts. The absence of this disease from the prisons is a matter for congratulation.

One case of cerebrospinal fever was reported.

Two cases of diphtheria, a very rare disease in this country, were reported, with one death.

One hundred and sixty-eight cases of tuberculosis, with forty deaths, were recorded, as against 109 with twenty-three deaths in 1914.

Venereal disease is extremely common. The returns do not in any way represent the true incidence of syphilis and gonorrhœa in the community. If the truth were known it would probably cause a very unpleasant surprise. An investigation into the extent to which these diseases are responsible for the high infant mortality, their effect on the birth-rate, &c., would make an interesting study.

One case of enteric fever in a European was recorded.

Helminthic.—Intestinal parasites are so common that it would be difficult to find a native who does not harbour one at least of the three common, viz., *Ascaris lumbricoides*, ankylostome (mainly *Necator americanus*), and *Tricocephalus dispar*.

The percentage of the population infected with ankylostomes is very high, probably over 80 per cent. These parasites, and especially the ankylostome, are of importance on account of their close association with those diseases from which one quarter of the deaths occur, viz., dysentery and diarrhœa. The presence and importance of ankylostomiasis is being increasingly recognized by medical officers, and the increase in the cases recorded is rather an index of this awakening than of any actual increase in the incidence of the disease.

Filariasis is common among natives, but rarely comes under treatment.

Guinea worm is common and is the cause of much disability. It is confined almost exclusively to the up-country stations.

EUROPEAN OFFICIALS.

The general health of the European official population has been good, and compares favourably with the previous year.

TABLE SHOWING THE SICK, INVALIDING AND DEATH-RATES OF EUROPEAN OFFICIALS.

Total number of European officials resident	*
Average number resident...	*
Total number on sick list	664
Total number of days on sick list	4,178
Average daily number on the sick list	11·4
Percentage of sick to average number resident ...	*
Average number of days on the sick list to each patient	6·29
Average sick time to each resident	*
Total number invalided	25
Percentage of invalidings to total number resident ...	*
Percentage of invalidings to average number resident	*
Total number of deaths	4
Percentage of deaths to total number resident ...	*
Percentage of deaths to average number resident ...	*

* Figures not available.

The following table shows the cause of invalidings and deaths:—

Cause	Invalided	Died
Malaria	3	—
Blackwater fever	2	—
Sun traumatism	1	—
Gastritis	2	—
Heart Disease	2	—
Chronic nephritis	1	—
Alcoholism	2	2
Neurasthenia	1	—
Appendicitis	1	—
Arthritis	1	—
Gastro-enteritis	1	—
Insomnia	1	—
Tonsilitis	1	—
Injury to knee	1	—
Loose cartilage in knee	1	—
Neuritis	—	1
Osteitis	—	1
Boils	1	—
Anæmia	2	—
Epilepsy	1	—
Total	25	4

It has been customary in the past to regard as invalids only those cases which became unfit to remain in the country prior to the expiration of a tour of twelve months' residential service, and this system has been adhered to.

NATIVE OFFICIALS.

So far as available statistics go the health of native officials compares unfavourably with the previous year, as will be seen from the following table:—

TABLE SHOWING THE SICK, INVALIDING AND DEATH-RATES OF NATIVE OFFICIALS.

Total number of native officials resident	*
Average number resident...	*
Total number on sick list	1,995
Total number of days on sick list	10,838
Average daily number on the sick list	29·6
Percentage of sick to average number resident ...	*
Average number of days on the sick list to each patient	5·4
Average sick time to each resident	*
Total number invalided	20
Percentage of invalidings to total number resident ...	*
Percentage of invalidings to average number resident	*
Total number of deaths	9
Percentage of deaths to total number resident ...	*
Percentage of deaths to average number resident ...	*

* Figures not available.

There have been but few soldiers in the Southern Provinces during the year, as almost all were drafted to the Cameroons.

The health of the police has been good. One case of yellow fever occurred in a police constable at Onitsha.

The health of prisoners has on the whole been fairly good. Chicken-pox was epidemic in the Agbor, Benin City, Forcados, Onitsha and Warri prisons, but was of a very mild type. Dysentery assumed serious proportions at Udi and Onitsha.

The physique of many of the prisoners is poor on admission, and the complete change of all the circumstances of life while in prison doubtless has an adverse effect on their general health.

Reliable statistics of the non-official European population are almost impossible to obtain, and this difficulty has been accentuated since the establishment in Lagos of a private practitioner and a private hospital.

Registration of the non-official native population being compulsory in Lagos and Ebute Metta only, these statistics are of little value.

SANITATION.

During the year progress in sanitation in the Southern Provinces of Nigeria has been adversely affected by the War; in many places it has not been found possible to carry out the work efficiently. Progress has, however, been made, mainly in regard to points which have necessitated only a small expenditure of money or none at all.

Colonial Medical Reports.—No. 72.—Nigeria (*continued*).

In December it was found necessary to second Dr. Inness for general medical and sanitary work at the Ngwo Colliery, near Udi. The need for laying out camps, the new station and native town, &c., in a satisfactory manner, and to ensure that proper sanitary precautions were adopted in the first instance, both generally and in the mine itself, rendered this a most suitable arrangement.

On account of the temporary removal of officers from certain stations there was a slight reduction of the staff of native sanitary inspectors, but as this only affected small and less important places the main work was not interfered with to any great extent.

The inspectors-in-training have, on the whole, made good progress. It will, I think, be found possible to utilize the services of these men on active work by the end of 1916, and they should prove a very valuable addition to our staff.

Visits of inspection were paid to as many places as possible, but for a considerable portion of the year the journeys could not be either so frequent or so extensive as was desired. On visiting stations suggestions, if required, are made to the health and executive officers and, where possible, to eminent local natives, and the reports contain those recommendations and others, which cannot be carried out without reference to headquarters.

Sanitary inspectors regularly and frequently visit all stations on the railway, at each of which there is at least one labourer detailed for sanitary work only.

At Port Harcourt the railway construction authorities appoint their own sanitary inspectors, and the expense of all works and paid labour is met from railway funds.

The Reservation Boards, which have been constituted under the Reservation Ordinance at a number of places in the "rivers," are taking greater interest in their work, with distinct benefit to the respective Reservations concerned, and as the moneys dealt with consist of contributions by the local mercantile firms as well as by the Government, a keener interest is taken by the members in the items of expenditure and the results obtained than would otherwise be tho case.

Mosquito and Insect-borne Diseases.

Malaria (*Anti-mosquito Work*).—Anti-mosquito work has been vigorously carried on at all the main stations. Mosquito returns are furnished regularly, and the results show a steady and gradual improvement. In most instances the index has already been reduced to a low figure.

In Lagos a special gang is employed for anti-mosquito measures alone, and continues its work with great advantage. This gang devotes its time to roof gutterings, crab-holes—an average of over forty per day being dealt with—and breeding places in trees, &c. Crab-holes provide an endless supply of mosquitoes, and adult insects or larvæ, or both, were found in over 11·5 per cent. of those dealt with. Results have proved this work to be of very considerable importance.

A great difficulty is the number of water receptacles kept in dark rooms; in Lagos 27·3 per cent. of the whole number being so placed. It is impossible to properly examine these pots unless they are removed outside, which is not always possible, as they are frequently embedded in the ground and of considerable size. In view of the large number of locked up houses, some of which remain closed for weeks consecutively, the difficulty of diminishing the prevalence of mosquitoes and lowering the mosquito index can to some extent be appreciated.

Interest in the prevention of mosquito breeding is gradually extending among the native population, especially in the large towns, and if offenders could be made to appreciate the danger to which they are subjecting others much more rapid advances would be made.

The occasions on which larvæ are found in wells by no means represent the number in which they exist, on account of the difficulty of thorough investigation, and even when they are observed the owners have a natural reluctance to having any larvicide added to the water.

At Calabar, special observations were made in the Botanical Gardens, under the direction of the health officer, to ascertain what plants are most favoured by mosquitoes for breeding purposes, and it was found that most of the bananas and pineapples and several of the palm trees were utilized by the insects for this purpose. In Lagos, as the records show, the insects also make use of holes, &c., in many of the large trees.

The work of inspecting roof gutterings, oiling of pools, filling in of hollows, drainage of small collections of water, the use of various larvicides, either with proper sprays or by other means, and the protection of tanks and other water containers is carried on at all stations. In some places the mosquito-proofing of barrels is extensively carried out, and is an important preventive measure. The latest form of barrel is provided with a double layer of gauze, the superficial one being in a removable frame. This allows of its being frequently taken out and cleaned without adult insects being given the opportunity to escape, and, in addition, diminishes the liability to injury.

The question of digging holes to obtain mud for building purposes, and thus providing cavities for the collection of water, is a large one, as having to carry mud some distance materially increases the expense of building, which to a poor man is an important item. A good deal could be done, however, if it were possible to forbid the digging of holes in a town without a permit from the health officer, which could be granted subject to certain conditions.

In reference to the taking of quinine as a prophylactic, the large decrease during 1915 is accounted for by the economy which it has been necessary to exercise on account of the increased cost and the difficulty of obtaining the drug.

This diminution must not be taken to indicate that the appreciation of its virtues is underestimated, as among the native population the practice of making use of the benefits it confers is extending.

The mosquito-proofing of houses is not in general favour, and, in fact, it is not everyone who has a mosquito-proof room who either uses it properly or sees that it is kept in proper repair, although this will always be done when requested. Many who have been provided with mosquito-proof bedrooms still use a net, as they "do not trust it." The number of natives who possess mosquito-nets has vastly increased, and it is often interesting to note the resources which have been tapped to obtain or make one.

Blackwater Fever.—The great decrease in the number of cases of this disease during the last twelve months is a very noteworthy feature. Although the European population has considerably increased, it is encouraging to find that the number of cases of both malaria and blackwater is steadily and rapidly falling.

This gratifying result can, I think, be attributed to a combination of causes, among the chief of which are improved conditions of life, spread of the knowledge of sanitary science and appreciation of its laws, and associated with these the taking of proper precautions against disease in which the personal element is so important a factor.

No case of trypanosomiasis in a European has been reported, and only seventy-three natives have been treated for the disease.

During the year cases of yellow fever were reported from Sierra Leone and the Gold Coast, but no outbreak of any extent was recorded.

I am very glad to be able to state that in Lagos, where, in 1913, so many suffered from this disease, no case has been reported.

Outbreaks, however, occurred at Onitsha in September and at the Engenni plantations in October, and at both places an "infected area" was declared and quarantine restrictions imposed.

At Onitsha, with the exception of the first, every case occurred within a very small and isolated area, thus rendering the epidemic very much easier to deal with than is usually the case. There were seven cases and one death, all the patients being natives.

It was difficult to ascertain the source of the outbreak, but it appeared very probable that the disease was brought up from the estuary of the Niger during the fishing season.

At Engenni, at the end of September and beginning of October, two deaths which were supposed to be due to yellow fever occurred among native employees, and five other patients were seen later who were suffering from mild attacks of the disease.

In November, the Coroner at Brass ordered a post-mortem examination of the body of a woman brought from Akassa, which proved that yellow fever was the cause of death. This led to further inquiries, but no trace of any other cases could be found.

In neither instance was it possible to obtain any information whatever as to the origin of the disease.

At Burutu, in August and September, two cases were diagnosed at intervals of over a month, both of which ended fatally. Dr. Laurie went down, and in conjunction with the medical officer of the station, the extra medical officer already there, and a European sanitary inspector, took active and thorough measures against any extension of the disease, and no further case was observed.

Of the 102 cases of filariasis recorded only one occurred in a European. This, however, must not be taken to indicate the extent of the affection among Europeans. Dr. Maples remarks that "Calabar swelling" is more common in Warri and Sapele than in Calabar itself, and the medical officer at Port Harcourt reports that several of the Europeans at that place are infected.

Epidemic Diseases.

During the year plague has been reported from Dakar, where apparently the outbreak was somewhat extensive, and from Cape Colony, where it was possible to keep it more under control.

On account of the above reports full precautions were taken here, and there has been no ground for even a suspicion of the disease on this part of the coast.

The measures for destroying vermin which were previously in operation in all coast ports were continued.

The following number of rats and mice were destroyed by traps and other mechanical means in Lagos: Rats, 13,305; mice, 8,087; total, 21,392.

Small supplies of Danysz virus have been received at regular intervals, and as its potency is very rapidly lost, it was always used immediately on arrival; but, even under those circumstances, satisfactory results were not always obtained.

Thirty cases of small-pox have been recorded, the majority of which were observed in the Western Province.

Nine occurred at Ibadan and fourteen at Abeokuta, the latter probably originating the epidemic outbreak reported early in 1916.

Lagos has been very free from this disease during the last few years, and the two cases which were observed in 1915 were in-patients who had just arrived from beyond Ibadan, where they had contracted the infection. The freedom of this town from the affection, where not very long ago it was endemic—the Infectious Diseases Hospital always occupied by a number of patients—can, I think, be attributed to the energetic prosecution of vaccination among the inhabitants in recent years.

The numbers vaccinated in the Southern Provinces are as follows:—

Total number vaccinated, 101,467; successful, 71,716; percentage of successes, 70·6 per cent.

We have received information of three cases of cerebrospinal fever, one in Lagos and two in the Eastern Province, but each was apparently an isolated instance of the disease. Although sporadic cases of this affection have occurred before, there is no record of it ever having assumed an epidemic form in the Southern Provinces.

Two cases of enteric fever have been reported, one from Calabar and one from Lagos. Both patients were European sailors, and both were removed from the same mail steamer.

There have been three instances of diphtheria affecting natives, one of which proved fatal. This is a disease rarely seen in Nigeria.

Chicken-pox is a very common affection, and a number of outbreaks have been reported, in practically all of which the Government prisons have formed important centres of the disease.

At Ikot-Ekpene over 200 cases occurred before the epidemic ceased, and at Warri and Port Harcourt the outbreaks were of almost as extensive a character. It is a disease comparatively seldom seen outside Government institutions, as private patients rarely present themselves for treatment unless compelled.

The question of the prevalence of tuberculosis is important, and further and more extensive observations are required.

The number of cases recorded during the last few years is as follows: 1913, 159; 1914, 109; 1915, 168.

The Resident Medical Officer of the Lagos Hospital states: "Tuberculosis is increasing and is of a most virulent type," and, at Calabar, there have been six deaths from this disease. Personally, I am also of opinion that the disease is extending, and other medical officers hold the same view.

In Lagos special accommodation is already provided for the treatment of prisoners suffering from the affection, and a special ward could, I think, be arranged without much expense for general patients in connection with the hospital on the Ikoyi Plains. In any case, however, the question of setting aside special wards in the large centres for cases of this disease is one which will soon become prominent.

The decrease in the number of cases of beriberi reported is very marked, and those seen have mostly been observed in patients voluntarily presenting themselves for treatment. The high mortality (383·9 per 1,000) is probably to be attributed to the fact that only the very severe instances of the affection were seen.

A very gratifying diminution in the mortality from tetanus, in comparison with that of previous years, is noticeable, and is apparently probably due to the treatment now adopted. Cases, 33; deaths, 12; mortality, 36 per cent.

One case of rabies was reported from Onitsha. This led to very definite and stringent precautions being adopted in relation to all dogs in the town and neighbourhood, and no further instance of the disease has occurred.

There is no doubt that gonorrhœa is very prevalent indeed, and is the primary cause of a considerable proportion of other affections, for which relief is sought. Syphilis, from all one can gather, is distinctly spreading.

The numbers given, which are obtained from the records available, cannot be looked on as in any way indicative of the prevalence of either affection, as the natives frequently do not trouble about them, unless there is any special reason, and Europeans seek, where possible, to be treated privately. At Calabar syphilis is said to be very prevalent, and not only there, but in all the Cross River districts.

The number of cases reported for the year are: Gonorrhœa, 1,669; syphilis, 266.

Only eighty-one cases of leprosy have been recorded, but this represents a very small proportion of the numbers affected. The principle of districts providing leper settlements for their own patients, which are kept up under the direction of their respective native courts, is rapidly extending and proving most useful. These, however, do not contain all those who suffer from the disease, as segregation is not compulsory, and many affected in a more or less mild degree still pursue their ordinary avocations.

The number of dysentery cases recorded shows a slight diminution on that of the previous year, but, unfortunately, the mortality is high, being 11·2 per cent. of the cases treated. Twenty-three Europeans suffered from the affection, but all recovered.

At Udi the mortality from this cause, in combination with ankylostomiasis, was extremely high, and towards the end of the year the prison was closed.

At Port Harcourt 327 cases were recorded, more than half occurring in the prison, where a special ward was set aside for the patients. Although other influences may have been at work, it appears probable that the epidemic arose from infected water. The well from which the water is obtained is very liable to contamination, and the fact that half the cases occurred among private individuals living in the neighbourhood and who obtained their water from the same source tends to support that view.

HELMINTHIC DISEASES.

In Calabar Hospital observations were made on a large number of consecutive patients, and the following results were obtained in regard to helminthic infections:—[1]

Ascaris lumbricoides	28·6	per cent.
Trichocephalus dispar	28·0	,,
Strongylus gigas	0.6	,,
Tænia solium	2·0	,,
Ankylostomiasis	13·3	,,
Negative	59·0	,,

These figures are, I should say, distinctly less than would be found in many parts of the colony. Some years ago a similar series of observations were made at the Lagos Hospital, where the percentage was very much higher.

The number of cases of ankylostomiasis observed, of course, represents an infinitesimal number of the infections. This affection appears to have a distinct influence on the incidence, severity, and mortality of dysenteric infections, and the adoption of systematic treatment of all persons in Government institutions who are infected is becoming recognized as more necessary with every succeeding year.

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[1] Many are double infections.

In the Eastern Province the death-rate among cases reported was 16·5 per cent. of those treated, and for the whole of the Southern Provinces 13·5 per cent.

The number of tæniasis infections reported shows a steady annual rise. From the present and previous records, Germans and Syrians appear to be the chief sufferers.

Six cases of bilharzia infections are recorded, but as in this part of the world the symptoms caused rarely lead to serious trouble the patients are not often seen.

The number of guinea worm infections observed is still rising. The parasite is more frequently seen in persons who have been travelling about than in those located at one place. Police and soldiers are often sufferers from the infection, and it appears probable that 1916 will show a further distinct increase.

At Abeokuta the pipe-borne water supply has led to a diminution of the disease, but not to its eradication, probably because many of the old sources of water are still utilized, the number of stand-pipes being inadequate for such a large town

Twenty cases of fluke infection are reported, thi being a considerable increase on previous years.

In view of the fact that 10 per cent. of the livers inspected in Lagos are infected by the liver fluke, *Fasciola gigantica*, it would be very interesting to know the forms found in these patients.

General Measures.

The methods of sewage disposal in vogue at the end of 1914 have been continued. At Calabar the new scheme, which had been prepared and approved, had to be held in abeyance as the necessary funds were not available. In Lagos no extension of the area of the pail system has been possible.

Except where rivers or creeks, &c., are more convenient the shallow trench method of disposal is everywhere adopted.

The principle of salgas does not lead to much expense, and, therefore, the practice has a tendency to extend. It is not, however, a method suited to the majority of places in Southern Nigeria, and should only be adopted in selected sites after careful consideration.

The system of public latrines has not been greatly extended during the year, as considerable expense would thereby have been involved. In the important towns the public latrines are carefully looked after and maintained in proper condition, special attendants being placed in charge. It is observed that where this course is not adopted the habits of the users do not, as a rule, tend towards cleanliness, which, in this particular, is sometimes found where least expected.

Refuse in the majority of cases has to be collected by hand labour, which is an expensive method. When the use of carts becomes more general, and in some places motor transport possible and available, great advantage will accrue.

Rubbish, &c., is usually burnt, but otherwise is buried or thrown into a river or creek. At places like Lagos, Forcados, Burutu, Bonny, &c., it is possible to use the residue after burning in reclamation work. Tins and bottles form a serviceable groundwork and are easily covered up with the softer material. I cannot but repeat the great improvement which has been brought about in many parts of Lagos by the adoption of this method.

The pipe-borne water supply of Lagos has at last become an accomplished fact, and on July 1 was opened by His Excellency the Governor-General. This was an event of the greatest local importance, and cannot fail to exert a most favourable influence on the health of the inhabitants.

The gradual filling up of the wells and the removal of tanks, barrels, roof gutterings, &c., which have always been a source of danger and expense, is now possible.

At Benin City a partial failure of the springs from which the water service is obtained occurred; action was, however, immediately taken which fortunately resulted in the flow reappearing.

The stand-pipes in Abeokuta are greatly appreciated, and the water is a vast improvement on that previously obtained from other sources. It can be still further improved and the system extended.

At several of the up-country stations perennial springs provide the supply, which, in some instances, is excellent. At other places reliance has to be placed on wells or tanks. Tanks are, on the whole, kept well protected, but the gauze is liable to become defective, and it is therefore necessary that they be frequently examined.

Barrels have been in great demand, and are in common use in Lagos, Forcados, and Burutu, and to a less extent in Calabar and Bonny. At only the first three places mentioned have efforts been made to any extent to get them made mosquito-proof.

Lagos is the only place where a system of subsoil drainage has been laid, and here it has proved very effectual, preventing, in the area affected, the periodical floods which used formerly to occur during the rains.

Permanent surface drainage has not been extended to any great extent, but the amount which has been completed has proved useful. At Forcados and Burutu especially, but also at other stations, considerable work has been accomplished in extending the existing systems of earth drains and in clearing and keeping clear those previously cut. At places such as those named, tidal drains are the only means of removing a large quantity of the water which occasionally accumulates, and their maintenance in good condition—which is essential—involves a considerable amount of labour.

The clearing of bush, undergrowth, &c., is now universally recognized as a necessary and important work, a large amount of labour being continually engaged on it at all stations.

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The usual extensive clearing, which is necessary at Calabar, Warri, Onitsha, and elsewhere, has been continued, and, in certain instances, an increase of the usual grant has been made for the purpose.

Reclamation has been carried out at Apapa and Forcados by means of sand deposited by the pump dredger. At the former place 44,000 cubic yards have been deposited, and at the latter considerable improvement has been effected.

At Lagos, Bonny, Burutu, and Port Harcourt similar work has been done by hand labour, although at the last mentioned place, where an extensive area of swamp has been converted into useful ground, the use of mechanical transport has afforded considerable assistance.

At Onitsha a market area has been acquired on the river bank, the land cleared of buildings, plans drawn up, and a commencement made in providing the necessary sheds. The erection of suitable market sheds would at many places be of great advantage to all concerned, and prove an investment immediately profitable financially and beneficial in general and more indirect ways. The trading instinct of the native makes him fully appreciate these buildings, of which he is prepared to take full advantage.

Where slaughter-houses have been put up the small fees charged are willingly paid, and these provide ample remuneration for the small amounts of money expended in their erection.

At large centres, where there is a considerable Mahommedan population, religious rites and customs have to be considered. These may lead at a later period to certain difficulties which will have to be grappled with.

The work initiated last year by His Excellency the Governor-General of having plans drawn up for segregation areas in connection with all stations, which could be gradually worked up to, has been continued, and will prove of great future advantage. These plans will serve for the guidance of future local officers as money becomes available and opportunity arises.

The infectious diseases hospitals have been maintained and have proved very useful adjuncts to sanitary work. The one at Lagos, which is situated between two and three miles outside the town, is by far the most advanced as regards personnel, equipment, and general arrangements. It is here that a building has been erected for prisoners suffering from tuberculosis, and it is in connection with this hospital that the special ward I have already suggested for tuberculosis patients might, I think, be arranged without great expense.

There are three sanitary stations in the colony—Lagos, Forcados, and Bonny—but fortunately it has not been found necessary to use any one of them during the year.

I am glad to say that the general conditions in the prisons are decidedly improving and more attention is paid to their sanitary state by the officers in-charge, whose views as to overcrowding and other matters are now more in accordance with the requirements of sanitary science than formerly.

At some stations the death-rates have been high, and one prison has been closed on account of the conditions existing. Although there are often various causes acting adversely on the health of the inmates, some quite outside prison influence, there are others, such as food and water, which can be remedied, and these as factors in disease are gradually being eliminated.

Lagos is the only town in the colony where there is a special health officer and where a European sanitary inspector is always stationed.

Progressive sanitation has, here as elsewhere, had to suffer as a result of the War, but in spite of that it has fortunately been possible to do more than simply continue the ordinary routine work.

The increasing amount of shipping entering the port adds considerably to the work and responsibility of the health officer.

As a result of the new water supply and the numerous stand-pipes, many of which are away from drains, more water than formerly lies about, thus providing mosquitoes with increased facilities for breeding, of which they are not slow to avail themselves. With the large amount of additional water entering Lagos daily the drainage of the town has become a question which has assumed a much more important character than formerly; but, unfortunately, it has not been found possible to continue the extension of the scheme drawn up by the municipal engineer to anything like the extent required. A more intimate collaboration between the engineers of the Government and the Municipal Board is required.

The changes being made at the Customs Wharf will affect the Municipal Drainage Scheme in that neighbourhood very considerably, and unless ample precautions be taken will lead to considerable nuisance arising.

The reclamation work at Oke Suna led to partial flooding of a portion of the town in the immediate vicinity, and action had to be at once taken to remedy the condition.

Bakeries and other places where food is prepared are receiving more attention, and a distinct improvement is noticeable. When the new Sanitary Ordinance comes into force it will be possible to make further progress. Endeavours are being made to increase washing facilities, and thus provide inducement for washing to be done at the public laundries instead of in small compounds. No steam laundry has yet been erected.

The macadamized roads, which are the most important and can be used by heavy traffic, have been kept in repair, but it has been impossible to properly maintain those made with laterite on account of their extent and the expense involved.

The introduction of the water supply will render the year 1915 a landmark in the progress of sanitary work in this town, and it is to be hoped that it will prove to be the immediate forerunner of a water-borne sewage system, which is becoming more necessary every succeeding year.

In spite of the public stand-pipes which have been provided, the wells show a distinct increase in number, although both the Government and the Municipal Board have closed many of those under their control.

The carrying out of the new market scheme at Alakoro has naturally been delayed, I trust only very temporarily, as the existing markets are much overcrowded.

The slaughter-houses are between one and two miles from the meat markets, and some method of transport for the meat other than by head load is very badly needed. When it is understood that thirty-eight carcases are brought to the markets daily, the question assumes considerable importance.

A system of street naming and house numbering has been introduced which will considerably facilitate sanitary work.

The fly nuisance has received a large amount of attention during the year, and results show the benefits accruing.

The rise of Port Harcourt has been very rapid, and the keen interest taken in it by His Excellency has led to the present advanced position, which will have such a marked influence on its future health and prosperity. European and native settlements have been laid out, reclamation and earth drainage steadily carried on, trading sites, European and native, have been decided on, and many buildings erected, a market place has been selected and a number of sheds put up, a slaughter-house provided, a most satisfactory aerated water factory established, which is very successful and of inestimable benefit to the residents in the whole district, and a pipe-borne water supply is under consideration.

Several covered wells have been made in the open spaces in the native town area, but the one which provides the main supply to the native population is outside the town. and although from its position it should be, and could be, made the best, it is probably, as a result of its condition, the worst.

A well in the European Reservation provides the main supply for that area, but distilled water can be obtained on request for drinking, and a few tanks collect rain water from the roofs. Residences raised six or more feet off the ground are succeeding those built on low platforms or on the ground itself, and in a low damp district such as this will prove a considerable improvement.

Sanitary work is carried out by the railway authorities under the direction of the medical officer.

Calabar is a place where a special health officer could be stationed with advantage, but unfortunately it has not been possible to provide even a European inspector.

The scheme approved for sewage disposal has had to be held over, and this, with extension of the permanent drainage system, are the main requirements.

Knowing the dangers and complications liable to follow the appearance of infectious disease at Forcados and Burutu, continuous and considerable work is always being carried on, and at the latter place the Niger Company spends a large amount of money on, and the agent takes a very keen interest in, sanitary work. Following the occurrence of sporadic cases of yellow fever the sanitary staff was increased and a European inspector stationed there. The drainage, which is so important a point in these places, has been greatly extended and made more efficient, and other improvements including extensive reclamation have been carried out.

Abeokuta is a very large and important town, and its proximity to and easy communication with the port of Lagos by road, rail and river renders its sanitary condition one of considerable amount to the colony as a whole. It was from this town that the first recognized case of yellow fever came; during 1915 there have been fourteen cases of small-pox, and, I may add, a considerable number more occurred early in 1916.

Suggestions for paying chiefs and their messengers to carry out sanitary work and vaccination have, however, been put forward for 1916, but it remains to be seen how they will work out.

The only means at present available to bring about improvement is personal persuasion, as no Sanitary Ordinances have been applied or adopted, nor have any rules or regulations been made. The necessity for action which will yield satisfactory results cannot be too strongly urged, and any course short of that will make little change and react adversely on the port of Lagos.

At Ibadan, which is a town with a circumference of nearly fifteen miles, the sanitary work is carried on by the chiefs and their messengers under the executive officer who directs the local government and is, as far as is possible, supervised by the medical officer. A considerable amount of good is being done, and the town is much cleaner than it was a few years ago.

The water supply is obtained from wells and water holes or water courses, many of which only contain water in the wet season. The salga system has been adopted, and a large number are now in use.

LECTURES.

Systematic courses of lectures have been given by the sanitary officers to the inspectors-in-training, and medical officers have, in the course of travelling in their districts, occasionally visited the schools. The chief method adopted of spreading sanitary knowledge is by addresses to the chiefs in the native courts.

The Director of Education has been good enough to furnish me with the following account of the teaching of hygiene in schools and the progress being made:—

"The elementary principles of hygiene and sanitation are regularly taught in all Government and assisted schools, and the reports of inspecting officers show that improvement in the method of teaching this subject is noticeable. This is markedly the case in large centres such as Lagos, Calabar, and Onitsha, where the principal schools are under direct European supervision. At the annual exhibition of school work which was held in Lagos in April, the work results in hygiene were very satisfactory, and highly commended by the medical officers who acted as judges. Practically all the schools in Lagos took part in the competition.

"There is, however, considerable room for improvement in schools which are at a distance from provincial and district headquarters, and not subject to regular European supervision or frequent inspection. In these schools the instruction given can only be characterized as mere catechism work, or the learning of question and answer by rote, without the practical application to daily existence of the principles of the subject or a clear appreciation on the part of teachers and pupils of the objective in teaching the subject.

"At the same time indications of progress, slow though it may be, are evident, and it may reasonably be expected that advance will be made as educational facilities improve."

RECOMMENDATIONS.

There are already several items involving expenditure which have had to be held in abeyance, and these will naturally be the first things taken in hand when opportunity occurs.

I desire, however, to draw attention to a few points which should, I think, receive attention with a view to early action when funds are available.

The appointment of a fourth European sanitary inspector.

The treatment of all public wells somewhat after the "Macgregor" plan.

The provision of destructors for refuse, &c., at all stations.

Arrangements for suitable market areas in all towns, so that later markets may be laid out and erected.

The appointment of Sanitary Local Boards in connection with stations where there are no Reservation Boards or with town where a number of merchants reside, so that the interest of the non-official Europeans in sanitary work may be increased and their services be utilized, as is the case in those places which come under the Reservation Ordinance.

That the question of the provision of a special ward for tuberculosis patients be considered.

That the Chief Sanitary Board on the railway include a sanitary adviser.

ARTHUR PICKELS,
Senior Sanitary Officer.

METEOROLOGY.

The climate is notoriously humid, and this characteristic has been more than well maintained during the year 1915. The rains began early, concluded late, and the rainfall was greater than in the preceding year, and indeed greater than for several years past.

At the close of the year the Harmattan commenced early, and was steadily maintained till the end of the year.

The rainfall over the Southern Provinces generally was above the average. In Lagos the precipitation amounted to 90·44 in. during the year. The maximum recorded was at Bonny, where 176·13 in. fell. The minimum, 38·91 in., was at Afikpo.

The temperature of Lagos is very uniform. The diurnal variation in 1915 never exceeded 23° F., the average being 11½° F. The absolute maximum of 97° F. occurred in March, while the minimum of 67° F. was registered in January, but the mean temperature curve shows March and July to have been the warmest and coolest months respectively. The daily curve is fairly regular, attaining its maximum about noon and minimum about 4 a.m.

The diurnal uniformity disappears as the places of observation come more within the influence of the Harmattan. Ogbomosho, for example, shows a maximum of 42 degrees of variation. There the maximum thermometer recorded a temperature of 111° F. and the minimum 52° F. The lowest temperature registered in the country, however, was 48° F. at Olokemeji.

Rheumatism, dysentery and bronchitis are intensified during the rains. Malaria is most common at the beginning and end of the rains; pneumonia in the Harmattan.

HOSPITALS AND DISPENSARIES.

The following is a brief account of the various hospitals and dispensaries throughout the Southern Provinces, and the work accomplished in connection therewith:—

Lagos Hospital.—The European wards in the Lagos Hospital contain thirteen beds; the whole building is mosquito-proof, and there is a portion specially proofed for yellow fever cases. One hundred and twenty-five European Government officials were treated, with one death, and thirteen European non-officials, with no deaths. Comparatively few European non-officials are now admitted to the Lagos Hospital, as there has been a private hospital established by an European private practitioner.

The native wards consist of three blocks with a total of fifty-two beds for males, and one block of fourteen beds for females and children. All are efficiently mosquito-proofed, and there is a special accommodation for yellow fever cases.

The X-ray apparatus has proved of very great assistance as an aid to diagnosis and has kept in very good order. It is run off the main, and is used both for screening and photography.

The pipe-borne water supply from Iju has been laid on and has proved a great convenience. It is hoped that the system can be extended later on when sufficient fittings and efficient drainage can be provided. A hot water supply is a necessity, and will, it is hoped, soon be installed. Plans for this have been put forward.

Three hundred and thirteen surgical operations were performed in the Lagos Hospital.

The Infectious Diseases Hospital is situated on Ikoyi Plain about two miles from Lagos. There are separate wards for small-pox, chicken-pox, yellow fever, measles, and tuberculosis. Thirty-eight cases were treated as in-patients.

Twenty-one thousand three hundred and seventy cases were treated at the various dispensaries in Lagos and Ebute-Metta during the year.

Calabar Hospitals.—The European hospital contains eight beds and is mosquito-proof. The following structural improvements were carried out, viz., a concrete outside staircase was added to each of the bath-rooms. The partitions between two sets of small and dark rooms have been removed, converting them into two wards to accommodate two patients each instead of four single-bedded rooms. This arrangement has several advantages.

The wooden supporting columns under the hospital which were being eaten by white ants have been replaced by concrete.

The Provincial Medical Office and Health Office have been removed from their objectionable situation under the hospital to separate buildings.

One hundred and twenty-two cases were treated, with two deaths; forty-one of these were officials. There were no deaths.

The native hospital is situated about a mile from the European hospital, and has an entirely separate staff. It is entirely mosquito-proofed, and contains fifty-seven beds.

A commencement was made of an X-ray installation and the addition of an operating theatre for septic cases to the out-patient department.

One thousand one hundred and sixty-four cases were treated as in-patients, with sixty-nine deaths.

At the out-patient department 9,457 cases were treated, and there were 26,232 attendances. Three hundred and eleven surgical operations were performed, as against ninety-nine in 1914.

At the prison hospital and dispensary there was a total attendance of 2,849.

The Infectious Diseases Hospital register shows a total of seventy-seven cases treated, mostly chicken-pox.

At the lunatic asylum twenty-four insane persons were treated, with six deaths.

At the new Barracks Dispensary 1,342 cases were treated, and there was a total of 8,478.

Warri Hospitals.—The European hospital has six one-bed wards and a well-lighted and ventilated operating theatre. The wards are mosquito-proof. There is an up-to-date X-ray apparatus. Forty-seven cases were treated as in-patients.

The native hospital consists of two buildings, one for males and one for females, and is mosquito-proof. There is accommodation for thirty patients. Three hundred and eighteen in-patients were treated. At the out-patient department there were 12,859 attendances.

The Infectious Diseases Hospital is on a well-isolated site, and is mosquito-proof, and consists of a main building of four rooms and an office. An additional small building of two rooms has recently been erected, and is also mosquito-proof. The total of in-patients was 179, nearly all chicken-pox.

Sapele Hospitals.—There are four hospitals and a dispensary, viz., European, native (with dispensary), infectious diseases, and prison. The European hospital contains four beds, and accommodated six patients during the year. There were no deaths. The wards are mosquito-proofed.

At the native, prison, and infectious diseases hospitals a total of 207 in-patients were treated. At the dispensary 2,171 cases were treated.

Ibadan Hospitals.—The European hospital has five beds and the native twenty. They are separate buildings, and are both mosquito-proof. There were twenty-one Europeans admitted, with no deaths. Two hundred and forty-three natives were treated as in-patients, with thirty-four deaths.

There were 3,385 out-patients treated at the two dispensaries.

Onitsha Hospitals.—At this station there is a European hospital, a native hospital, and a dispensary. The European hospital has four beds, the native twenty-four. All are mosquito-proof. The number of admissions to the European hospital was thirty-nine. At the native hospital 630 cases were admitted as in-patients, and 6,917 as out-patients.

Benin City Hospitals.—There is a native hospital, prison hospital, and a dispensary. The native hospital has eight beds, the prison two. There were 160 in-patients and 1,303 out-patients.

Forcados.—The European hospital (containing four beds), after structural alterations had been completed and equipment supplied, was opened in October. From that date to the end of the year there were five cases admitted. The native hospital has had a new theatre built and a female ward added, with accommodation for three patients. making a total of twenty beds. Two hundred and ninety-eight in-patients were treated, with twenty-three deaths. A new dispensary with offices has been opened, at which 5,515 out-patients were treated.

The European hospital is entirely, and the native hospital partially, mosquito-proofed.

Okwoga Hospital.—There are two hospitals—a brick building for natives and a "bush" hospital for prisoners. There is a dispensary under the same roof with the former.

Agbor Hospital.—There is a native hospital and dispensary. One hundred and thirty-two in-patients were admitted; out-patients, 1,780. A permanent brick hospital and dispensary are required at this station.

Badagry Hospital.—There is a native hospital and dispensary only with accommodation for twelve patients. Fifteen in and 1,410 out-patients were treated. There were four deaths.

Epe Hospital.—There is a good native hospital with dispensary, but since the outbreak of War little or no work has been done there.

Degema.—There is a brick native hospital with ten beds and dispensary.

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Brass.—A native hospital built of brick containing six beds.

Ikot Ekpene.—The medical buildings consist of an old " bush " hospital with seven beds and a brick dispensary, containing also an office and store-room. There is also a similarly constructed mortuary. A large permanent native hospital is in course of construction at this station.

Bonny Hospital.—There is a brick hospital containing fourteen beds and a dispensary.

Opobo Hospitals.—There is a European hospital with four beds, and a native hospital with ten beds. Eleven Europeans and 1,633 natives were treated as in-patients.

There are two dispensaries—one in the station and one in Opobo town. 1,633 cases were treated.

Port Harcourt Hospitals.—The hospitals at this station are temporary, pending the erection of proper buildings.

Five Europeans and 435 natives were treated as in-patients. There were 2,397 natives treated as out-patients at the dispensary.

Obubra and Obudu Hospitals.—These are both brick hospitals, but no medical officer was stationed at either.

Under this section no reference has been made to the prevailing diseases treated at each of the hospitals. The recording of any particular disease is more dependent on the district than the institution—thus leprosy is almost exclusively found in the region of the Niger River, trypanosomiasis in the Cross River districts, guinea worm in the up-country stations, away from the great rivers. It is only at the larger hospitals in the coast towns—Lagos, Warri, Calabar—where the natives are more enlightened that any material difference in the work of the hospitals can be appreciated. In these institutions a large amount of good general surgical work is done—gynæcology, eye work, &c.

SCIENTIFIC.

Scientific work has been severely handicapped during 1915 owing to the War, the exigencies of which have rendered it necessary to withdraw many medical officers from their stations and throw additional work upon others; transfers have necessarily been frequent, and there has been a general state of unsettledness, which has not been conducive to the prosecution of research work. But little original work has therefore been done beyond that of the Medical Research Institute.

Observations have been continued by Drs. T. B. Adam and R. H. Brierley into the prevalence and best modes of prevention and cure of ankylostomiasis, but this has not as yet assumed a sufficiently crystalline form to embody in this report.

Dr. Adam has done a great deal of work in connection with this disease and its relation to dysentery, and expresses his view as follows:—

" There is a strong probability that the relation between ankylostomiasis and dysentery is a very intimate one. The extensive and severe ulceration of the lower bowel is probably brought about either by the introduction of a bacterial organism with a selective action on the lower bowel (by the ingestion of rubbish and soil as in the well-recognized symptom of geogaphy), or in the late stages of the very profound anæmia so characteristic of ankylostomiasis (such an ulceration as is found in pernicious anæmia).

" Dysentery and diarrhœa cannot well be dissociated, and both may owe their origin largely to helminthic infection. Taken together they have an incidence of 61·2 per 1,000 cases of disease treated, and a case mortality of 58 per 1,000, while the deaths from these diseases constitute 80·8 per cent. of the total deaths from all causes of cases treated in this Province during the year 1915."

H. B. S. MONTGOMERY,
Acting Principal Medical Officer.

NOTES ON A CASE OF HELMINTHIC INFECTION ASSOCIATED WITH PARAPLEGIA IN A EUROPEAN.

NOTES BY DR. RICE.

Friday, September 3.—Patient complained of " pins and needles " finger tips.

Saturday, September 4.—Patient complained of a " loose feeling " at knees and accentuated tingling and numbness of fingers. Suspecting poisoning, I gave him pil. cal. c. col. at night, and mag. sulph. ½ oz. on the morning of

Sunday, September 5.—Patient still complained of looseness of knee-joints and ankles. Bowels opened five times during night, with some vomiting. Some difficulty in walking. Was massaged twice.

Monday, September 6.—Difficulty in walking very marked. I massaged him every four hours. Knee-jerks completely absent. Pupils react to light and accommodation. Ate a good lunch, but only had chicken broth for dinner.

Tuesday, September 7.—Seemed a little better and said he had dozed a good deal during the night, but not had a good sleep. Massage and tonic continued. Egg, milk, and brandy, ½ oz. every four hours. Difficulty in walking more marked. Can hardly stand.

Wednesday, September 8.—No power in legs at all. No wrist or foot drop. Speech good. Pupils reacting well. Complains of weakness in swallowing, and numbness of the throat and also of the buttocks. Has never complained of pain anywhere at any time. I massaged him once and gave him his tonic, and left at 9.30 a.m. for Ameke. Dr. E. L. Sieger arrived at 11 a.m. and took over the case.

(Signed) F. Rice,
Medical Officer, Amoji.

Notes by Dr. E. L. Sieger.

On the 8th I attended A. B., relieving Dr. F. Rice, who was proceeding to Port Harcourt. Dr. F. Rice gave me full particulars of the case.

On examination of the patient I found the muscles of the limbs flaccid, the knee reflexes totally absent, and paresis markedly present. The patient was unable to stand or rise without assistance. There was also loss of muscular power and limitation of movement in both arms, and tactile sensation was dulled. The limbs of the right side were more affected than the left. Foot and wrist drop were absent. The patient complained of tingling, numbness and fugitive pains on the left side of the trunk, back of the neck, and left side of the face. In the evening ptosis of the left eye was present, with swelling of the lower lid. As the patient was restless in body and mind, and complained of a succession of sleepless nights. I gave him 20 gr. pot. bromid., and he slept well. The temperature and pulse rate were normal.

At 8 a.m. on the 9th I again examined the patient and found all the symptoms aggravated. Paresis gave place to paralysis of the lower limbs; the ptosis was more marked and accompanied by hyperæsthesia of the left side of the face. His speech became slower and his articulation less distinct, and he complained of slight difficulty in swallowing. Taste was not affected.

Viewing with uneasiness the rapid progression of these unfavourable symptoms, I telephoned to Dr. Rice to remain at Ameke and take the patient to Port Harcourt Hospital. I brought the patient into Ameke that afternoon and consulted with Dr. Rice, and we formed the opinion that the case was most probably one of acute ascending paralysis.

Throughout the time I had the patient under my charge I carried out Dr. Rice's treatment, and the patient took plenty of nourishment. Dr. Rice resumed charge of the patient that evening.

(Signed) Edward L. Sieger,
Medical Officer, Ameke.

Notes by Dr. Rice (*continued*).

Friday, September 10.—On re-taking over the case I noticed ptosis of the right eye very marked. The left side of the mouth is drawn down. Difficulty in swallowing and coughing.

Left Ameke 6.15 a.m. and arrived Port Harcourt at 12.30 p.m. Patient was in bed in the train all the time and stood the journey well, and was handed over to Dr. Neale.

(Signed) Frank Rice,
Medical Officer, Amoji.

Notes by Dr. Neale.

Patient arrived in Port Harcourt at 12.30 p.m., Friday, September 10. He was conveyed on stretcher to hospital. On examination I found him unable even to turn over in bed, or raise himself up in any way. He was extremely irritable. The left eye was wide open and staring. Patient was unable to close it. This gave the appearance of slight ptosis of right eye. Both pupils reacted to both light and accommodation. The left angle of the mouth was drawn down. The tongue, when projected from the mouth, was quite straight and even, not inclined to either side. When drinking, liquid tended to dribble from the drawn down left angle of the mouth.

Right arm could not be raised at all, and fingers only moved very slightly and slowly. To the patient the fingers felt numb and heavy. There was a papular rash on the flexor aspect of the forearm. The muscles were flaccid. Sensation was present, but dulled. Left arm could be raised slightly, and there was a little more power in the grip. The feeling of numbness and heaviness was not so marked in this hand. Fingers could only be bent very slightly. A pin-point applied to the fingers gave a sensation of intense heat. There were also papules on the flexor aspect of the forearm.

Abdomen and thorax appeared normal as to sensation and general examination. There was dulness over the bladder area, and the patient said he had been unable to pass urine since the previous day. Neither had he had a movement of the bowels for four days. He complained that he felt very uncomfortable inside, but felt he had no power either to pass urine or fæces.

I deferred further examination, proceeded to empty his bladder by catheter, drawing off 26½ oz. Temperature, 98·4° F.; pulse, 46.

Condition on examination continued. The uncomfortable feeling passed off after the bladder was emptied. Right leg—muscles flaccid; can draw up leg a little way with great difficulty. Sensation very dulled. Knee-jerk absent. Ankle clonus *nil*. Unable to move toes. Although patient is very ticklish about sole of foot in health, this sensation is now entirely absent.

Left leg is not so paralysed as the right. He can raise his knee slightly against hand pressure on knee. Unable to move toes. Knee and ankle reflexes absent.

There appeared to be no hyperæsthesia anywhere. On testing with a pin the dulled sensation extended over the whole of the legs and thighs, up to a point from 1 in. to 1½ in. above Poupart's ligament.

Patient complained of difficulty in swallowing.

He took plenty of light nourishment. Being very restless and irritable I prescribed 5 gr. chloretone at 11.30 p.m. After this he slept quietly till 5 a.m. next day.

September 11.—As patient was still unable to pass urine, I again drew it off by catheter—24½ oz. Clear, acid, sp. gr. 1,017, albumin. Soapy water enema was then given, with only a small result—thin and dark in colour. The following mixture was prescribed:—

Potass. brom.	gr. 10
,, iodid.	gr. 2
Liq. strych. hyd.	♏ 5
Liq. arsenicalis	♏ 2
Syr. aurantii	dr. ½
Aquam ad	oz. 1 t.d.s.

Also quinine 5 gr. daily.

Glycerine was also injected *per rectum*. Later on a large dark motion was passed, with scybala, and a few drops of urine. I made a careful examination of this stool, and found the most extraordinary collection of undigested food—concretions of bits of vegetables and seeds matted together with hairy and fibrous material. These I found were from the husks of palm nuts. Microscopic examination of the fæces revealed large numbers of helminthic ova, chiefly ankylostome. Although I could find no adult ankylostomes, I was surprised to find ankylostome larvæ.

On questioning the patient as to his eating habits, I elicited a history almost identical with a similar case reported by me in last year's annual report—a history of "wolfing" one's food, masticating nothing, swallowing it down without a single chew.

I at once decided that the paralysis in this case must be of toxæmic origin, probably produced by the large helminthic infection. I therefore prescribed as follows:—

Beta-naphthol, 10 gr., every morning on empty stomach for six mornings.

September 12.—Beta-naphthol given at 6 a.m. Slept till nearly 8 a.m. At 8.30 took quaker oats, omelette and tea. At 9.30 he passed 16½ oz. urine without any trouble. A further motion was passed and examined. There were many ova, some of which I was unable to identify. No tricocephalus ova or worms were found.

Patient is much more cheerful to-day. He can move his right arm slightly. He took all his food throughout the day readily. This is, of course, minced, or cut up very finely. Chloretone, 8 gr., given shortly after dinner in the evening.

September 13.—As patient was feeling the heat very much and was very restless, I gave him at 12.30 a.m. the following draught:—

Ammon. brom.	gr. 15
Chloral hydras	gr. 5
Spt. ammon. co.	♏ 40
Tr. card. co.	dr. ½
Aq. ad	oz. 2

He slept quietly till nearly breakfast time. Urine clear, acid, sp. gr. 1,018, albumin less. Eye (left) not so staring to-day. More power in both arms and legs. Mouth less drawn. Drinks without any dribbling. Hands not so numb. Patient much more cheerful. All symptoms subsiding.

September 14.—Patient had a good night's sleep after above draught at midnight. Mist. sennæ co., 1½ oz., given at 7 a.m.

Patient much better. Left eye less prominent. Able to raise right arm easily. More power in both legs. Was lifted into deck chair and put in verandah. Taking all meals well. Urine still contains albumin, but much less in quantity. Bowels moved once during the day. Calomel, 4 gr., given 9 p.m.

September 15.—Another good night passed. The papular rash on the forearm seems to have come to the surface and causes a lot of itching. Increased power in arms and legs. Albumin less to-day. Mist. sennæ co., 1½ oz., given at 8 a.m. Bowels moved three times. Soft, well digested, and good colour. Microscope showed ova very greatly diminished. Some curious large spirilla found on several occasions.

I omitted earlier to mention the blood examination. The only abnormality found was very marked leukæmia.

September 16.—Symptoms still improving. More movements in fingers. Numbness less. No sign of any return of knee or ankle reflexes. Left eye not so staring. Lid comes down a little more over the eyeball. Mouth straighter. Able to raise both arms over the head. Albumin still present in urine. Sp. gr. 1,020. Rash and irritation disappearing from arms. Calomel 2 gr. given.

September 17.—Further steady improvement noted. Patient was able to turn over in bed without assistance for the first time. Still some albumin in urine. Bowels moved once. Opened a small chigger abscess at side of toe nail, fourth, left foot. Patient has been very careless in his mode of living in his station. Walks about his bush house in bare feet, consequently has had, he says, dozens of chiggers removed from his feet by his boys.

September 18.—Patient had another very good night, a half of the bromide draught having been given at midnight. Bowels open once. Albumin still in urine. Increased power and field of movement. Can nearly hold a cup in his two hands in order to drink from. Is able to turn over on either side in bed without assistance. There are certain ova in the fæces closely resembling those of *Ascaris lumbricoides*, which I am unable to identify.

September 19.—Instead of Beta-naphthol I gave santonin 5 gr., calomel 3 gr., at 6 a.m. Also, I substituted the following mixture for what he has been taking thrice daily:—

Syr. ferri. iodidi	dr. ½
Liq. strychnin. hyd.	♏ 5
Liq. arsenicalis	♏ 2
Aq. ad	oz. 1 t.d.s.

Patient feeling much better. Sat up on edge of bed by himself. Gave his lower bowel a wash out with soapy water enema. Mouth practically quite straight to-day. No sign of return of absent reflexes.

Medical Board held yesterday found patient to be suffering from "Paralysis of toxæmic origin, with albuminuria."

INVESTIGATIONS BY DR. E. E. MAPLES AT CALABAR.

An investigation was held into the various positions in which the appendix is found in natives, by observation on dead bodies brought in for *post-mortem* dissection. Classifying according to the hour positions, the following results were obtained:—

	Per cent.
(*a*) In quarter past hour position	33·3
(*b*) In hour position	9·53
(*c*) In twenty-five minutes past hour position ..	9·53
(*d*) In half past hour position	9·53
(*e*) In quarter to hour position	9·53
(*f*) In five past hour position	4·76
(*g*) In ten past hour position	4·76
(*h*) In twenty-five minutes to hour position ...	4·76
(*i*) In coiled up directly behind cæcum ...	14·3
	100·0

In 42·9 per cent. the appendix had at least one coiling as it lay in its position; this is inclusive of the 14·3 per cent. of cases in (*i*) above where the appendix lay coiled up directly behind the cæcum.

In 9 per cent. of cases there were signs of old inflammation by way of adhesions, &c., surrounding or involving the appendix.

HEPATIC ABSCESS.

An investigation was held on six dead bodies to see if it was possible to perform an operation for exposing the liver by way of the chest wall without opening the pleural cavity, an operation which has been recommended by various writers, especially Rickman Godlee. In no case, after removal of portions of the tenth and eleventh ribs, was it found possible to strip the pleura off the right thoracic wall and the upper surface of the diaphragm, without tearing the pleura, which is particularly thin in this situation. I therefore conclude that if a liver abscess is to be opened by way of the chest wall and diaphragm, the pleural cavity must of necessity be opened.

In my experience I have so far never failed in succeeding in opening and draining hepatic abscess through the abdominal wall, and I believe it is always possible to open, and with the aid of the Fowler position to satisfactorily drain, any liver abscess through the abdominal parietes.

VARIETIES OF MOSQUITO IN CALABAR.

In 1915 Mr. A. D. A. Macgregor, the Station Magistrate, very kindly undertook an investigation into the varieties of mosquito present in Calabar. The larvæ were kept and hatched out, and the following species were identified: *Stegomyia fasciata; Stegomyia thomsoni; Stegomyia periskelata; Myzomyia funesta*, var. *Umbrosa; Culex fatigans; Pyretophorus costalis; Myzorhynchus paludis; Myssorhynchus maculatus; Chrysoconops euscopennatus; Toxorhynchites brevipalpis; Tæniorrhynchus.*

The absence of anopheles is a remarkable feature.

At the native hospital an unusual and rare case of sarcoma, arising from the scapula, was operated on. The patient refused to have an inter-scapulo-thoracic amputation of the upper limb performed, but after ligature of the sub-scapular artery, the whole of the scapula and half of the clavicle and the upper end of the humerus were removed, together with the contents of the axilla. The latter procedure was found necessary, as it was discovered during the operation that the axillary glands were secondarily infected with sarcomatous growth, a condition very rare with sarcoma, although common enough in epithelioma. The patient died after operation from shock.

Several cases have been treated which form a distinct group not infrequent among natives, both men and women; I refer to those in which there is a chronic fibrosis with ulceration and stricture of the rectum in men, and of the vagina, external genitals, and the rectum in women. These cases might be thought to be of specific origin, but in my opinion they are not; the ulceration certainly improves under salvarsan and other specific treatment, but does not clear up. Nor do I think they are malignant in origin. I have come to the conclusion that they properly correspond to the Esthiomene of French writers, a condition which is ignored so far as I know by English observers, with the exception of Herman (in his "Diseases of Women").

Another uncommon case occurred in which, during the performance of a hysterectomy for fibroid, it was found necessary to remove both ovaries and Fallopian tubes, on account of cysts in the former organs and pyosalpinxes in the latter. Although a certain amount of pus escaped into the pelvis the patient made an uninterrupted recovery.

A rather unusual feature of the hernia cases operated in 1915 has been the comparative frequency with which hernias par glissement were met with, and in which usually the bladder and sometimes the cæcum and appendix were encountered. Among twenty-nine cases of radical cure for hernia performed, seven (i.e., 24·1 per cent.) proved to be such gliding hernias.

One case of septic mastoiditis was treated in which a complete Stacke's operation was performed, and subsequently the internal lateral sinus was opened and drained for septic phlebitis; the patient subsequently died of pyæmia.

Remarkable results were obtained from the treatment of bad cases of syphilis in natives with salvarsan or one of its substitutes. In all seventeen injections were performed with most gratifying immediate results.

Colonial Medical Reports.—No. 72.—Nigeria (*continued.*)

EXTRACT FROM REPORT.

By W. RALSTON, B.Sc.Lond., F.I.C., Government Chemist, Nigeria.

Miscellaneous Work includes an analysis of twelve kinds of native foodstuff used for the prison dietary at Sierra Leone. The results obtained can be applied to Nigeria and other parts of the West Coast, so it might be considered useful to publish a short summary of my report for general information. The results are shown in the table below, and a few brief explanatory remarks are added.

The yams and potatoes were cooked, mashed and dried till the weights before and after cooking were identical, and the percentages therefore may refer both to the raw material as to the cooked foodstuff. The refuse shown represents matter not eaten, while the two columns for "Dry solids" and "Water" represents 100 parts of edible foodstuff, the percentages of the dry constituents being detailed in the other columns. The sum of these constituents in each case equals the total dry solids. The cocoa-yam specimen was much decayed, but normally the refuse will probably be about the same as for other yams and potatoes (15 to 16 per cent.).

PERCENTAGES.

Foodstuffs	Refuse and dirt	Dry solids	Water	Ash	Fibre	Proteids	Carbo-hydrates	Oil	Calories per lb.
Rice	0·67	84·12	15·88	0·45	0·10	7·31	75·83	0·43	1,532
Yam (ordinary)	16·5	33·38	66·62	0·64	0·41	2·02	30·24	0·07	597
Cocoa-yam	113·0	39·49	60·51	1·05	0·57	2·44	35·30	0·12	702
Sweet potatoes	15·4	43·9	56·1	0·54	1·0	1·94	39·99	0·43	799
Foofoo (wet)	—	33·12	66·88	0·28	1·23	0·69	30·80	0·12	600
,, (dry)	—	92·93	7·07	0·77	3·44	1·93	86·44	0·35	1,685
Palm oil	0·02	—	0·58	—	—	—	—	99·42	4,017
Split peas	—	87·57	12·43	2·35	1·26	24·62	57·47	1·87	1,592
Oyo (fresh, green)	88·2	15·88	84·12	1·77	1·18	3·63	8·44	0·86	276
,, (dried)	—	93·53	6·47	10·4	6·95	21·38	49·73	5·07	1,625
Ockro (dried)	—	75·44	24·56	5·68	7·11	11·41	49·74	1·5	1,303
Native peppers—									
(*a*) Small pod red and green mixed (fresh)	—	24·57	75·43	1·29	6·88	3·77	9·11	3·52	510
Small pod red and green mixed (dried)	—	93·25	6·75	4·89	26·10	14·32	34·57	13·37	1,905
(*b*) Large pod red (dried)	—	93·9	6·1	5·75	25·93	17·61	31·06	13·55	1,905
(*c*) Large pod green (dried)	—	91·85	8·15	5·35	26·30	20·69	30·41	9·1	1,776
Large pod green (fresh)	—	13·48	86·52	0·78	3·86	3·04	4·47	1·33	261

The "calories per lb." column gives a scale for comparing the food-values of the different foodstuffs, carbohydrates (with fibre) and proteids being each equivalent to 1,820 calories per lb., and the oil to 4,040 calories per lb. A former analysis of ordinary potatoes gave these a value of 438 *calories per lb.*, so that with this result and those found for rice and split peas agreeing with published tables, the results shown in the table may be compared directly with those for other well-known foodstuffs.

A series of experiments was made to extract the "essential oil" from limes, the yield obtained being about 0·2 per cent., and samples were prepared to be sent to the Imperial Institute, London, for valuation. An investigation was also begun to ascertain the yield of alcohol that might be expected from the carbohydrates in yam. An estimation of the *starch* proved that this practically was the only carbohydrate present.

Referring to my earlier work on food values, as stated above, a comparison between the carbohydrates reveals the fact that yams contain about one and a half times as much starch as potatoes do. The potato has been a profitable source for alcohol, so it is to be presumed that the yam under similar conditions should be even more profitable. Theoretically, one chemical ton (2,000 lb.) of yam would yield 600 lb. starch, equivalent to 666 lb. glucose, or 340 lb. alcohol.

This 340 lb. *absolute* alcohol would yield 42·5 gallons of 98 per cent. alcohol, suitable for most commercial purposes. Assuming manufacturers sold this at 3s. a gallon, and bought the 2,000 lb. yam at £2, there would be a balance of over £4 to meet the costs of production and yield a profit. So far my best result has been a yield of glucose equivalent to 26·1 per cent. of the yam, equivalent to 13·3 per cent. as alcohol, instead of a theoretical yield of 16⅔ per cent., but as the investigation is not complete it would be premature to say more.

Colonial Medical Reports.—No. 73.—Trinidad and Tobago.

MEDICAL REPORT FOR THE NINE MONTHS ENDED DECEMBER 31, 1915.

By **HENRY L. CLARE,**

Surgeon-General.

Administration.

The fixed establishment of thirty-seven medical officers on March 31, 1915, when there were three vacancies, remained unaltered at December 31, 1915, but during the intervening nine months three senior medical officers—Dr. Eakin, Dr. Boucaud and Dr. Alston—retired from the service, making six vacancies in all to be filled. As recorded in my last annual report, appointments were made by the Secretary of State in the three vacancies that occurred during 1914-15, and Doctors Mahabir, Weldon and Brewster assumed duty here in April and July, 1915. Dr. Weldon's resignation, however, was accepted within a fortnight of his arrival, and Dr. Sue was temporarily appointed in August to be a supernumerary medical officer. It has not been found possible to obtain candidates for appointment in the other vacancies, although inquiries were made in Canada as well as in Great Britain, so that the available professional staff at December 31, 1915, was and continues at the date of this writing to be three officers below the authorized standard, which is still further reduced by Dr. Dickson's appointment under the War Office during the continuance of war and by the absence of Dr. Clarke, who left here last September in medical charge of the first Trinidad contingent of troops.

It has been very difficult to provide efficiently for the work of the department with a professional staff so depleted; leave of absence, except in cases of urgent need, has been necessarily in abeyance, and I gladly acknowledge the devotion to duty of the medical officers and their acceptance without murmur of prolonged tropical residence, as well as of the increased duties and responsibilities that the present emergency has imposed upon some of them.

Vital Statistics—Public Health, &c.

Figures relating to a period of nine months intervening in a series of full years during the current intercensal decade do not lend themselves readily for contrast and deductions with the corresponding data obtained for successive periods of twelve months each, and accordingly I do not propose to offer any comparisons or to suggest any conclusions to be derived from the statistical information that is available for the interrupted period.

The population of the Colony estimated by the Registrar-General to the middle of the nine months period ended December 31, 1915, is 361,811, and on this estimate the following birth- and death-rates for the nine months are computed:—

Birth-rate	31·52	
Death-rate (crude)	21·26	
Natural increase of population (registered births over deaths)		2,796
Number of deaths of children under one year		1,334
Number of still births registered		701
Infant mortality rate	155·28	

The principal causes of death are shown in the following table, which also displays the death-rate from each cause per 1,000 living.

Cause of death	Number	Death-rate per 1,000 living
Malaria	479	1·73
Tuberculosis (all forms)	412	1·5
,, pulmonary	371	1·36
Bronchitis and bronchopneumonia	359	1·32
Pneumonia	180	0·66
Cardiac diseases	172	0·63
Dysentery	361	1·32
Diarrhœa and enteritis	710	2·6
Enteric fever	121	0·44
Ankylostomiasis	159	0·58
Old age	309	1·13

The general health of the Colony, as disclosed by the reports of the district medical officers, was on the whole satisfactory, with some excess of malaria in certain districts, which is attributed to increased rainfall in the latter part of the period. With the exception of four district medical officers who record a few cases of the malignant type of malaria, all the others report the disease to be of the mild or benign tertian variety. There was no unusual prevalence of endemic disease with the exception of small outbreaks of dysentery in the Bocas and Arima districts, which were soon controlled; in the Colony generally there was a decrease in the usual incidence of dysentery, which also was of a less virulent form. Enteric fever prevails in an increasing degree nearly all over the Colony; there were 160 cases and 121 deaths (a very high proportion) brought to notice within the nine months, yielding a death-rate of 0·4 per 1,000 living. This disease remains unnotifiable, and the observations

RETURN OF DISEASES AND DEATHS FOR NINE MONTHS ENDING DECEMBER 31, 1915, IN THE FOLLOWING INSTITUTIONS: COLONIAL HOSPITAL, SAN FERNANDO HOSPITAL, DISTRICT AND YAWS HOSPITALS.

Trinidad and Tobago.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	13	1	13
Anæmia	106	12	107
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	2	—	2
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	61	6	67
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	11	3	13
Diabetes Insipidus	—	—	—
Diphtheria	8	1	8
Dysentery	326	64	335
Enteric Fever	299	58	327
Erysipelas	3	1	3
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhœa	160	—	174
Gout	1	—	1
Hydrophobia	—	—	—
Influenza	15	—	16
Kala-Azar	—	—	—
Leprosy	—	—	—
(*a*) Nodular	—	—	—
(*b*) Anæsthetic	3	—	3
(*c*) Mixed	2	—	2
Malarial Fever—	—	—	—
(*a*) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	386	6	394
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(*b*) Remittent	55	3	55
(*c*) Pernicious	96	18	97
(*d*) Malarial Cachexia	39	—	39
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	65	1	67
Malignant	54	16	48
Old Age	29	9	32
Other Diseases	66	25	69
Pellagra	6	3	6
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	66	—	71
Rheumatoid Arthritis	16	—	16
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	4	2	5
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(*a*) Primary	29	—	32
(*b*) Secondary	46	—	46
(*c*) Tertiary	134	11	114
(*d*) Congenital	15	8	16
Tetanus	14	11	15
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(*a*) Phthisis Pulmonalis	—	—	—
(*b*) Tuberculosis of Glands	—	—	—
(*c*) Lupus	—	—	—

	Admissions	Deaths	Total Cases Treated
GENERAL DISEASES—*continued.*			
(*d*) Tabes Mesenterica	—	—	—
(*e*) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	7	3	7
Varicella	—	—	—
Whooping Cough	3	—	3
Yaws	1,155	—	1,346
Yellow Fever	—	—	—

LOCAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Diseases of the—			
Cellular Tissue	320	6	347
Circulatory System	—	—	—
(*a*) Valvular Disease of Heart	132	35	140
(*b*) Other Diseases	76	24	77
Digestive System—	—	—	—
(*a*) Diarrhœa	80	34	85
(*b*) Hill Diarrhœa	—	—	—
(*c*) Hepatitis	9	—	11
Congestion of Liver	4	2	5
(*d*) Abscess of Liver	13	—	14
(*e*) Tropical Liver	—	—	—
(*f*) Jaundice, Catarrhal	1	—	1
(*g*) Cirrhosis of Liver	116	47	133
(*h*) Acute Yellow Atrophy	—	—	—
(*i*) Sprue	—	—	—
(*j*) Other Diseases	670	61	702
Ear	20	—	26
Eye	174	—	191
Generative System—	—	—	—
Male Organs	558	16	572
Female Organs	434	27	472
Lymphatic System	97	6	98
Mental Diseases	100	—	134
Nervous System	164	30	178
Nose	25	—	25
Organs of Locomotion	186	8	187
Respiratory System	683	204	729
Skin—	—	—	—
(*a*) Scabies	—	—	—
(*b*) Ringworm	—	—	—
(*c*) Tinea Imbricata	—	—	—
(*d*) Favus	—	—	—
(*e*) Eczema	30	—	31
(*f*) Other Diseases	686	9	761
Urinary System	439	166	467
Injuries, General, Local—	613	17	655
(*a*) Siriasis (Heatstroke)	—	—	—
(*b*) Sunstroke (Heat Prostration)	3	1	3
(*c*) Other Injuries	21	6	24
Parasites—	4	—	4
Ascaris lumbricoides	6	1	6
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	639	72	660
Filaria medinensis (Guinea-worm)	4	—	9
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	1	—	1
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	5	1	5
Nature Unknown	—	—	—
Other Poisons	26	2	27
Surgical Operations—	2,290	43	2,290
Amputations, Major	—	—	—
,, Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(*a*) Cataract	22	—	22
(*b*) Iridectomy	1	—	1
(*c*) Other Eye Operations	22	—	22

under this head in my annual report for 1914-15 apply again with increased force. The Colony was happily free from any case of plague or yellow fever during the nine months. I regret to say that there is no change to record in the tuberculosis situation in the Colony.

The campaign against ankylostomiasis is still pursued with vigour, and achieves, I think, excellent and permanent success; monthly progress reports of the operations have been submitted regularly.

Courses of lectures, followed by a lantern demonstration and examinations, were delivered by the assistant medical officer of health (acting) at populous centres to school teachers on the subject of elementary and practical hygiene; the lectures were well attended, and at the subsequent examinations some of the teachers exhibited a fair acquaintance with the lessons that had been inculcated. As a means of spreading a general knowledge of the broader principles of practical hygiene and sanitation these lectures should serve a very useful purpose, and if possible it would be desirable that arrangements should be made for regular annual courses.

PORT-OF-SPAIN.

The exhaustive report by the sanitary inspector (acting) which accompanies this deals ably with the sanitary circumstances of the city.

BACTERIOLOGICAL LABORATORY.

The return of specimens examined at the bacteriological laboratory shows that the work at that institution has assumed considerable proportions. As the bacteriologist is during the greater part of each day engaged in outdoor work as assistant medical officer of health and sanitary inspector, he can only get through routine examinations for diagnosis purposes, research work being out of the question. Nevertheless, considering all the circumstances, a total of 1,435 specimens (exclusive of rats) examined in nine months denotes a fair amount of work done.

The following are short notes concerning the more important specimens examined:—

Blood.—872 specimens were examined mainly for malaria and enteric, and a few for filaria. Malaria: 432 of the above were films examined for malaria, sixteen benign tertian cases were returned, and seventy-five positive subtertian. There were 341 films examined with negative results. Enteric: 394 specimens were examined for enteric fever. Of them 209 gave a positive Widal reaction, and 185 negative.

Sputum.—Of 294 specimens of sputum, two were for pneumococci and the others for tubercle bacilli; 106 showed tubercle bacilli present, and 186 were negative.

Urine.—Numerous specimens were examined for nature of deposit, diazo reaction, &c. In two cases tubercle bacilli were looked for; an inoculation of guinea-pigs was carried out.

Throat.—Fourteen throat swabs were examined for diphtheria, both in smears and cultures. Of them ten were positive and four negative as regards the presence of Klebs-Löffler bacilli.

Fæces.—Ninety-nine specimens were examined, of which thirteen were found to contain amœbæ, thirty-seven ova of ankylostoma, one maggots, one round worms, and one pus. Forty-six specimens were negative.

Tumours.—Of thirty-one tumours of which paraffin sections were made and examined, twenty-two were found to be malignant, one was a gumma, and the others were non-malignant.

Ox.—Eleven spleens gave positive results in smear and culture for anthrax; seven were negative.

Examination of Water.—Regular analyses of the supply of the town were carried out, two samples being examined each month from different parts of the supply, either from the reservoirs or from public standpipes or private service taps.

The results show the water to be of potable quality; the number of organisms per cubic centimetre was very variable.

Interesting results were obtained in the samples examined for the month of April, 1915. Sample 1 was maraval water before filtration, and showed 200 organisms per cubic centimetre, as compared with 40 per cubic centimetre in Sample 2 of water from the same source after filtration through Bell filters.

One may here refer to the results of chemical analysis of similar samples by the Government analyst for the same month.

The results showed that filtration had caused no change or, at any rate, almost none in the quality of the water; the only differences being that the unfiltered water contained 36 parts of total solids and ·001 part of albumenoid ammonia per 100,000, as compared with 35 and ·002 respectively in the filtered water.

Filtration, therefore, had the effect of reducing the amount of total solids by 1 part per 100,000 and increasing that of albumenoid ammonia by ·001 part per 100,000.

Kala-azar.—During the year the systematic examination of every enlarged spleen found post-mortem at the Colonial Hospital Mortuary was undertaken with the view of discovering the presence of Leishman-Donovan bodies.

With the large East Indian population here, one believes that the disease must occasionally occur and pass unnoticed. Up to the present, however, no case has been discovered giving positive microscopic results.

I have recently been informed by Dr. Rose, the bacteriologist, that the position in British Guiana is pretty much the same as in Trinidad, no positive evidence having up to the present been obtained of the presence of kala-azar in that colony, although search has been made.

C. F. LASSALLE,

Acting Government Bacteriologist.

Colonial Medical Reports.—No. 73.—Trinidad and Tobago (*continued*).

CITY OF PORT-OF-SPAIN FOR NINE MONTHS, APRIL 1 TO DECEMBER 31, 1915.

METEOROLOGICAL STATISTICS.

The following figures are from records of the Department of Agriculture, based on observations taken at the St. Clair Experiment Station during the calendar year 1915:—

METEOROLOGICAL RECORD—JANUARY TO DECEMBER, 1915 (PORT-OF-SPAIN).

Barometer—mean daily register	29·982
Thermometer—mean maximum	85·3
,, ,, minimum	67·6
Mean annual temperature	76·4
,, ,, relative humidity	81·0
Rainfall	56·31

RAINFALL.

January—1915	... ...	2·10	inches
February ,,	... ...	0·66	,,
March ,,	... ...	—	
April ,,	... ...	2·63	,,
May ,,	... ...	2·76	,,
June ,,	... ...	7·05	,,
July ,,	month of highest rainfall	12·76	,,
August ,,	... ...	5·27	,,
September ,,	... ...	4·21	,,
October ,,	... ...	9·28	,,
November ,,	... .	7·84	,,
December ,,	.. ..	1·75	,,
		56·31	

During the year the prevailing winds were from the following directions of the compass, in order of number of observations:—

DIRECTION OF WIND.

N.E.	335	observations
S.E.	175	,,
E.	67	,,
N.	39	,,
N.W.	39	,,
S.W.	36	,,
S.	25	,,
W.	14	,,

The prevailing winds are therefore easterly, the commonest being N.E.

VITAL STATISTICS.

The following is a summary of the vital statistics:—

Population of the City of Port-of-Spain (estimated to middle of August, 1915)	64,863
Natural increase, i.e., excess of births over deaths, *minus*	90
Area of city	1,338 acres
Density of population	48 persons per acre
Number of births registered	1,245
Birth-rate	25·47
Number of deaths registered ...	1,335
Death-rate...	27·31
Number of deaths of infants under 1 year	271
Infantile mortality rate	210·9
Tuberculosis death-rate	3·6 per mille
Enteric fever death-rate	·98 ,,
Malaria death-rate	·49 ,,
Diarrhœa and enteritis death-rate ...	3·5 ,,
Dysentery death-rate	·49 ,,

Population.—This was estimated by the Registrar-General to be 64,863 at the middle of August, 1915.

The density of population, viz., about forty-eight persons per acre over the total area of the city, is slightly larger than that of the previous year (1914-1915), when it was forty-seven persons per acre.

Births.—The number of births registered was 1,245. Of these 603 were males and 642 females, the proportion being approximately 106 girls to every 100 boys. The birth-rate was 25·47 per 1,000 of population.

In my report for the year 1914-1915 reference was made to the fact that the birth-rate of Port-of-Spain had gradually declined from 42·25 per 1,000 in 1905-1906 to 27·78 in 1914-1915.

A comparison of the birth-rate for the period under review with that of the preceding ten years would not be of much value. It is, however, possible to assume that the tendency of the birth-rate to decline is still maintained, the birth-rate in the period under review being 25·47 per 1,000. The still-births during the year numbered ninety-three—that is, 7·4 per cent. of the live births. This percentage is 1·07 less than that of the previous year.

Deaths.—The total number of deaths from all causes registered in the city during the nine months was 1,335. There were, therefore, ninety more deaths than births.

The crude death-rate for the nine months under review is 27·31 per 1,000.

The crude death-rate for the full year 1914-1915 was 31·54 per 1,000.

The birth-rate during the nine months was lower than the death-rate by 1·84 per 1,000.

Causes of Death.—The appended Table A shows the number of deaths and the rate per 1,000 of population of each of the principal causes of death to December, 1915.

The following figures refer to the most important causes of death:—

	Number of deaths	Rate per 1,000
Enteric fever	48	0·98
Malaria	24	0·49
Dysentery	46	0·94
Tuberculosis	176	3 6
Cancer	35	0·71
Pneumonia	25	0·51
Diarrhœa and enteritis ...	173	3·5

Infantile Mortality.—The number of deaths of children under one year of age was 271, and the infant mortality rate 210·9 per 1,000 births registered between April and December, 1915.

During the year 1914-15 the infant mortality rate was 157·6.

As in previous years diarrhœal diseases provided the largest number of deaths among infants, improper feeding being no doubt mainly responsible for the result.

The formation of a Baby Saving League in Port-of-Spain, as has been effected in Georgetown, the capital of British Guiana, as well as the provision of milk depots which are operating so successfully in other countries, are questions which no doubt will in the near future occupy the serious attention of public spirited persons in the community who have at heart the welfare of children, and especially the children of the lower classes. Infants' milk depots are of French origin, and are of two kinds, viz.:—

The "Consultation de nourrissons" and the "Goutte de lait."

Of the first type some are attached to lying-in hospitals where infants are kept under medical supervision as out-patients for the first two years of their life.

Others are in the nature of milk dispensaries where medical supervision is exercised. The "Goutte de lait" (or drop of milk) is a milk dispensary from which infants are fed under medical supervision upon sterilized milk with or without modification.

In France most of the infants' milk depots are conducted on a philanthropic basis and supported purely by voluntary subscriptions.

The first depot of this kind was started in 1892 at the "Charité Hospital" in Paris. In 1893 the first milk depot for the sale of pasteurized milk for children under 5 years of age was started in New York. In England the first milk depot was opened in 1899 at St. Helens in Lancashire. Since that date depots have been established in many towns in England more or less following the French type. It is unnecessary to give in this report fuller details of these admirable institutions. One may be allowed to hope that before long, either by the generosity of charitably disposed persons among us, or by efforts of the municipality or a combination of both these agencies, Port-of-Spain may take its place among advanced cities in this particular matter.

TUBERCULOSIS.

The number of cases of tuberculosis regarding which this department received information was 157, and is ten more than the number reported from April to December of the previous year. Of the total number of cases reported, 146 were cases of pulmonary tuberculosis.

The anti-tuberculosis work of the Sanitary Department is confined to—*Firstly*, the disinfection of rooms (including bedding, furniture, &c.) which have been occupied by sufferers from the disease either after their removal to the Colonial Hospital or after death. *Secondly*, the disinfection of rooms or houses before occupation by healthy persons, more especially when suspicion arises regarding the health of the previous occupants. It is gratifying to observe the frequency with which house occupiers submit requests for this work to be done, and such requests are invariably promptly attended to. *Thirdly*, the improvement in the ventilation of houses throughout the town, especially since the coming into force of the New Order of the General Board of Health with respect to ventilation and overcrowding.

It is particularly with regard to the ravages of tuberculosis that one looks forward to the maximum benefit to the community from the operation of this order.

Another important means of combating tuberculosis was that adopted by the City Corporation in the course of 1915.

The Port-of-Spain City by-laws were revised during the year, and opportunity was taken to include under them a by-law which makes it illegal to spit in certain public places and vehicles.

The by-law reads as follows:—

"No person shall spit on the floor, side or wall of any public carriage, or of any public hall, public waiting-room, or place of public entertainment, whether admission thereto be obtained upon payment or not, nor upon the footway of any public street."

Its rigid enforcement will no doubt result in much good as one of the preventive methods for dealing with tuberculosis.

ENTERIC FEVER.

As in previous years, the majority of cases of this disease were reported from the Colonial Hospital. The notification of cases other than those who seek admission to this institution, though very desirable, never takes place at present except in a few isolated instances, and will only be enforceable when enteric or typhoid fever becomes one of the compulsorily notifiable diseases.

There was a total of 143 cases in nine months as compared with 147 in the previous twelve months. Forty-seven of them occurred in premises within the sewerage district, and ninety-six in the non-sewered parts of the town—that is, there were forty-nine more cases in the non-sewered than in the sewered area of Port-of-Spain. There were thirty-eight deaths, giving a case mortality of 26·5 per cent.

Preventive Measures.—In all cases of enteric the premises, including rooms, beddings, privies, &c., were disinfected as soon as possible after the receipt of notification of cases from the Colonial Hospital, and in the few of those who were treated at home, disinfection was carried out as soon as the patients became convalescent. The assistant sanitary inspectors were instructed in the latter set of cases to do all in their power to instruct and assist householders in carrying out instructions of the physicians in attendance to prevent the spread of infection.

Cause of Enteric Fever Prevalence.—It has not been possible up to the present to definitely establish any single cause which of itself is entirely responsible for the prevalence of typhoid fever in this city. The following are usually considered to be its principal disseminating agents, viz.: Infected drinking water, infected milk, flies, carrier cases, direct infection from the sick to the healthy by means of various discharges of the body.

Water Supply.—The public water supply of Port-of-Spain, though, like that of almost any other town of similar size, susceptible of improvement in certain respects, has never been proved to be the cause of any enteric fever outbreak in the town. Any outbreak of the kind due to the consumption by the inhabitants of infected drinking water has invariably in other countries been characterized by being of an explosive nature and of large dimensions, i.e., a large number of cases have occurred almost simultaneously.

Milk Supply.—The sale of milk in Port-of-Spain is controlled to some extent by the sanitary authority, aided by the Constabulary, acting under powers conferred on them.

Under this Ordinance, regulations have been made by the General Board of Health, there being four sets of such regulations. Under those made on August 6, 1895, no person suffering from leprosy, yaws, or any infectious disease is allowed to milk or tend any milch cow, and the sanitary inspector has power to prohibit the sale of milk by any person suffering from any of the diseases mentioned.

There is no power, however, to prevent the sale of milk from premises on which a case of infectious disease such as enteric fever exists. The liability of the milk to contamination from the discharges of such cases of illness in the dwellings of the vast majority of cowkeepers and dairymen is obviously great.

The milk supply of the City of Port-of-Spain, particularly from places outside the city limits, such as St. James and San Juan, is for this among other reasons constantly subject to suspicion, and undoubtedly is one, if not the most important, of the vehicles of enteric fever here. This source of danger is capable of being done away with, or, at any rate, very largely improved by new powers of control, which it is hoped will soon be in the hands of the sanitary authority.

Flies.—The house-fly is to-day recognized as one of the most common of the carriers of enteric infection, and although the City Council by-law requiring the provision of covered dustbins for the collection of house refuse on all premises in the town came into force many months ago, there are still a great many dwellings in Port-of-Spain on which most unsuitable receptacles, such as uncovered and leaky old baskets, tins, and boxes are employed, which provide very fruitful places for the generation of flies. The fly problem, therefore, in Port-of-Spain is in process of being solved; with its solution will disappear one of the most serious agents in the spread of enteric.

Carrier Cases.—In every community a certain proportion of the incidence of enteric fever is the result of infection from "carriers." Such carriers are usually persons who have suffered from either slight or severe attacks of the disease, and for a very long period after recovery continue to excrete typhoid bacilli in the stools or urine, or both It is a very interesting fact that the gall-bladder provides a suitable home for the bacilli, and it is even stated that typhoid bacilli may by their action occasionally provide the nuclei around which gall-stones are formed.

A basis of three persons per 1,000 of population in a town in which typhoid fever prevails has been accepted as the average number of carriers in it. On such a basis there would be more than 180 carriers in Port-of-Spain. Nevertheless, carriers, however numerous, have not prevented the conspicuous decline which has taken place in the prevalence of enteric in the large cities of Great Britain. Hence, the danger of the average carrier would appear to be almost negligible, and the general preventive measures at present employed seem adequate to cope with the carrier also.

Direct Infection from the Sick to the Healthy.—Contact by attendants—especially ignorant ones—with cases of enteric fever is no doubt an important means of spreading the disease in a community like ours. Negligence in the disposal of the excreta—both urine and fæces, which abound with very large numbers of bacilli, the non-disinfection of soiled clothing, the actual contact of friends and relatives with patients in a dangerously infectious stage of the malady—are all circumstances which exist in the majority of fever sick-rooms in Port-of-Spain.

The great wonder is that there are so few premises in which more than one member of a household is attacked. On all the premises on which enteric occurred there was no extension of the disease to any other person after the attack on the first member of the household.

Enteric at Maraval.—On April 17, 1915, it was reported there were several cases of enteric fever at Maraval above the reservoir.

Inquiries at Maraval were immediately started, and samples of water were taken for chemical and bacteriological examination before and after filtration.

There were only four cases which were known to have occurred in Maraval village. They were all virulent cases attended by grave complications, including hæmorrhage from the bowel.

The residences of the four cases were situated on Maraval village lands east of the main road, the distance from the river in each case being between 100 and 200 yards.

The liability of the contamination of the river from the discharges was considered to be very remote.

The infection was most probably contracted in Port-of-Spain. The patients all travelled to town daily, and no previous cases of the disease, which would certainly not have escaped notice, had they occurred, had been observed in or near the village.

Measures Adopted.—Yards were cleaned up by the order of the sanitary inspector, houses were scrubbed and disinfected with solution of Kreso, and the patients were removed to the Colonial Hospital as soon as they were discovered. Chemical and bacteriological examination of the unfiltered Maraval water, as well as the filtered water, during the month of April showed the water to be of normal quality.

Nevertheless, it should not be lost sight of that the water of the Maraval Stream, owing to the proximity to its banks of residences and cesspits, is liable to organic pollution at various points in its course. The Maraval water before being distributed throughout the town is passed through a series of efficient Bell filters at St. Clair, and this reduces very largely, and probably actually extinguishes, any risk that there may be of contaminated water from this source being consumed by the inhabitants of the town.

PROTECTIVE INOCULATION AGAINST ENTERIC FEVER.

The efficacy of this procedure, first introduced in the year 1896 by Sir Almroth Wright, M.D., F.R.S., has long ago passed out of the experimental stage, and is now universally considered to be proved beyond doubt. It was first employed to any considerable extent in 1899 during the South African War, when it did much good, but not as much as was expected of it, owing mainly to the fact that a sudden demand was made for large quantities of the vaccine to protect an army in a country heavily infected with enteric, at a time when it may be said to have not yet emerged from the stage of experiment.

In 1904 the Anti-typhoid Committee of the British Army Council, composed of the leading British authorities in the science of bacteriology, in their interim report, recommended the method for adoption in the British Army as a voluntary measure.

In 1912 the final report of the Committee was published. The histories as regards typhoid fever of 19,314 soldiers, whose average period abroad was twenty months, was closely followed, and every precaution was taken to verify the diagnosis bacteriologically.

Of this number 10,378 were inoculated, 8,936 were not inoculated; it was found that 5·39 per 1,000 of those inoculated, and 30·4 per 1,000 of those not inoculated, suffered from typhoid.

The Commission recommended that every measure that may be considered practicable should be employed to extend the practice of anti-typhoid inoculation in the Army. In the opinion of the Committee its universal application was desirable.

In the present War the experience among the British Expeditionary Force in France and Belgium, of whom 95 per cent. have been protected against typhoid, has shown that the annual ratio of admissions to hospital per 1,000 men is more than nine times greater among the non-protected than among the protected. Among the non-protected it is 9·1 per 1,000, whereas among the protected it is 1 per 1,000.

The death ratio is thirty-one times greater; among the non-protected it is 1·84 per 1,000, and among the protected ·06 per 1,000.

In a community there is no doubt that, granted that the water supply is above suspicion, the best preventives against typhoid fever are the observance of general sanitary rules and careful personal cleanliness, more especially among those in attendance on, or in more or less close proximity with, cases of the disease. Viewing the difficulty of controlling the personal factor, however, a supplementary safeguard appears to be necessary, so that in a thickly populated centre the maximum of all preventive methods may find application, and thus security from attack be ensured to the full extent of human possibility.

No better additional prophylactic measure is known to us at present than the protective inoculation against typhoid fever by means of "vaccines" properly prepared, which should, I think, be generally employed in Port-of-Spain as well as throughout the whole colony. In other countries this method of prevention is being largely used. In British Guiana its use has been placed within the reach of most of the inhabitants; the results there should prove to be interesting, and may be expected to point a salutary lesson.

DISINFECTION OF PREMISES FOR VERMIN.

This was carried out by spraying the inner walls, floor, and bedding with a mixture of cyllin, soft soap, and kerosene in 548 cases, mostly licensed common lodging-houses known as coolie hotels. These coolie hotels are under the regular supervision of the sanitary inspectors.

The total number of rats and mice caught during the nine months amounted to 7,661 rats and 3,660 mice. With regard to rats there has been a considerable falling off in the past six years. In 1910-11, 28,618 rats were accounted for, giving an average of 2,393 per month. In 1914-15 the figures were 10,923 and 910. In the nine months, April to December, 1915, the average per month was only 638. If one could believe that this great reduction in the number of captures was due entirely to the corresponding diminution in the number of these rodents in the town, it would be very gratifying. One suspects, however, that the anti-rat measures in operation are not susceptible of sufficient variation to circumvent the wily rodents. However, new baits and new methods of laying them from time to time are employed.

As in previous years, anti-rat work was specially and mainly directed against the common breeding-grounds found mostly in large provision stores and warehouses in the lower part of the town. The varieties of rats obtained were those generally well known, viz., *Mus rattus* and *Mus decumanus*, there being 3,135 of the former and 3,763 of the latter.

There were six rat-gangs operating in various districts of the town, each gang consisting of a driver and three boys. They used 397 traps of two kinds, viz., Cage traps and Giant or Snap traps; the latter generally gave better results. The gangs brought in 4,154 out of the total of 7,661 rats caught during the nine months.

Poisoned bait was laid specially in stores where it was readily eaten by rats, but on residences the use of traps is preferred, owing mainly to the risk to children and poultry from the poison.

Colonial Medical Reports.—No. 73.—Trinidad and Tobago (*continued*).

Wherever rat runs or holes were discovered orders were issued to house owners to have them stopped; in some places low-lying flooring next the ground had to be raised so as to get at and deal with the rat nests. An important anti-rat measure employed generally is the requiring of all refuse and waste food being kept securely covered in proper receptacles on private premises, and more especially in hotels and restaurants. The assistant sanitary inspectors report that they have been assured by merchants that the destruction of their goods by rats has been considerably reduced as compared with the time before the anti-rat campaign was started. As a matter of fact, fewer complaints are made than heretofore.

The landing of rats in packages of imported goods and from lighters alongside the Customs has been observed. This would seem to call for some preventive measures being adopted with regard to lighters, and with the help of the Port Health Officer's staff efforts should be made to reduce this source of increase of the rat population of the town, which to some extent must nullify the good effects of our campaign on land.

Cesspits offer admirable places for the nesting of rats. Accordingly, rat holes whenever found in the sides of the pit wall are filled in. The rendering of cesspits fly-proof serves the other useful purpose of preventing the entrance of rats.

Collection and Removal of House Refuse.

The by-laws made by the City Council on January 28, 1915, relating to the collection of house refuse by house occupiers in Port-of-Spain have up to the present not been rigidly enforced. One reason for this was that the by-laws placed the duty of providing suitable receptacles on house occupiers. It was found impossible to enforce them with regard to barrack yard premises, of which there are nearly 2,000, owing principally to the fact that the occupancy of barrack rooms is in many cases of an insecure and fleeting nature.

Accordingly, under Section 31 of the Port-of-Spain Corporation Amendment Ordinance of 1915 (a proviso to Section 315 of the Principal Ordinance), the Corporation obtained power to exact that in the case of barracks the owners should be required to provide dustbins. It is hoped, therefore, that in the near future all premises in the town will be provided with them.

Disinfection of Cesspits.

The old custom of occupiers, in response to orders to disinfect their cesspits, throwing a few drops or a small quantity of disinfectant down a cesspit and so satisfying themselves, and in their view the wishes of the sanitary authorities has been replaced by the system under which this department contracts to thoroughly spray cesspits with crude petroleum, which is thinned by the addition of a small proportion of distillate oil or kerosene. This is a very important measure, as the application of crude oil, in addition to being a deodorant, serves the other beneficial purpose of preventing the development of the larvæ of flies and mosquitoes. It is therefore one of the most important preventive processes employed against the spread of insect-borne diseases, e.g., dysentery and enteric, and one which will, it is expected, gradually extend and find favour with the sanitary authorities in country districts.

Mosquito Prevention.

Anopheles.—Considerable improvement has taken place in the drainage of the few areas within the city limits, which were referred to in the report for the previous year, as providing breeding grounds for the malaria mosquito.

(*a*) The filling and draining of the low-lying part of the Woodbrook Savannah near the seashore has been undertaken in accordance with a definite plan prepared by the city engineer.

This work is in progress, and before long should be satisfactorily completed.

(*b*) The low-lying lands east and south of the railway station have had some attention bestowed on them in the way of draining and oiling.

In the course of inspection by one of the assistant sanitary inspectors, a unique case of the existence of anopheles and stegomyia larvæ on the same premises was discovered at No. 12, Victoria Avenue, the former in a kerosene tin holding stagnant water, and the latter in an antiformica. Inquiry to trace how the anopheles mosquito came to the premises showed the possibility of its having been brought in the baggage of the occupiers who had recently returned from a holiday at the islands.

It is unlikely, however, that this is the true explanation of the presence of anopheles.

Stegomyia and Culex.—The number of these has been kept as low as possible by the regular attention of the assistant sanitary inspectors to the usual breeding places, e.g., antiformicas and eaves-gutters, empty bottles, tins, shells, and other receptacles which hold water in sufficient quantity and long enough to allow the development of mosquito larvæ. Favourite breeding places of the common house mosquito Stegomyia and Culex are the antiformicas used inside of dwellings in the shape of tins containing water, in which the legs of furniture, e.g., tables and safes are placed, as well as dishes or plates under water vessels and flower pots.

It is well that the attention of the public should be specially directed to this very common, though often overlooked, origin of mosquito prevalence in dwelling-houses. Naturally, the sanitary inspector is unable to deal with them as efficiently as with the ordinary receptacles found in yards and gardens; his efforts are therefore mainly directed towards instructing house occupiers and relying on their promise to do what is necessary.

Regular inspection of eaves-gutters by the eaves-gutter gangs was carried out, the number of eaves-gutters inspected being 6,244, in 899 of which water was found, and in 392 stagnant water containing mosquito larvæ was observed.

Prosecutions for breach of the Yellow Fever Regulations were laid against 102 householders, the convictions obtained being 101.

Elementary Schools.

The regular medical inspection of schools and school children is at present amply provided for in most of the towns of Great Britain. The establishment of a system of school inspection that will suit the needs of the Colony must be seriously considered in the near future.

It is only by the close and cordial co-operation between sanitary authorities and the Department of Education that such a system could be brought into being and a workable scheme evolved.

The subject naturally divides itself into two parts, viz.:—

(1) The sanitary condition of the buildings and playgrounds, including such important particulars as the adequacy of ventilation, the cleanliness of floors, desks, benches, &c., and the measures adopted, e.g., scrubbing, sweeping, for keeping them clean, the means of refuse disposal, the system of the disposal of excreta, and the condition of playgrounds, especially as regards the presence of dust.

(2) The health of the children, especially as regards contagious diseases and the commoner diseases of the eyes, e.g., trachoma, as well as of the ears, nose, and throat.

The early recognition by the skilled eye of the physician of symptoms of any illness included in any of the groups mentioned safeguards not only the affected child, but what is more important, prevents the extension of acute infections or parasitic skin diseases to other children in the school.

In the course of the year 1915 all the elementary schools of Port-of-Spain were kept under observation by the sanitary authorities. Special reports were called for from the assistant sanitary inspectors towards the close of the year, and they were asked to report under the following headings with regard to each school, viz.: Condition of building; condition of playground as regards dust, cleanliness and size; arrangements for sweeping, dusting, and scrubbing of the floors, inner walls, partition; system of disposal of ordinary house refuse, e.g., sweepings, waste-paper, &c.; system of disposal of excreta; general remarks.

In many of these particulars I was satisfied from inspection that conditions were satisfactory. In other matters, however, especially with regard to scrubbing, dusting, and sweeping, very much is left to be desired. The attention of the managers of the schools was drawn by the inspectors to any unsatisfactory conditions discovered, and one is pleased to be able to report that already improvements have been effected in many of the schools.

Barracks.

In connection with the new Order by the General Board of Health relating to ventilation of houses and overcrowding in dwellings, a census of barrack yard premises in the city was undertaken, and full particulars to be recorded on printed forms were obtained by the assistant sanitary inspectors.

The total number of barrack premises in the town was found to be 1,866, the definition of barrack and barrack yard adopted being that given in the Public Health Ordinance, 1915, viz.: "Barrack or barracks" includes any building or collection of buildings divided into rooms occupied singly or in sets by persons of the poorer class, and to which there are a common yard and common convenience. "Barrack yard" includes a barrack or barracks and every yard appurtenant to a barrack.

Of the total number of barrack yards a certain number was classed as "troublesome" yards, viz., those which it was found difficult to keep constantly in clean sanitary condition.

The "troublesome" yards amounted to 216, and necessitated very frequent and, in many cases, daily visits by the assistant sanitary inspectors. Apart from structural defects, for which the owners are responsible, nuisances on barrack premises mainly result from: *Firstly*, the indiscriminate littering about by the tenants of all kinds of rubbish; *secondly*, the fouling and usually unclean condition of w.c. arrangements; and *thirdly*, the fouling of and accumulation of refuse in surface drains, in some cases due to inadequate or no arrangement whatever for the regular cleansing of them.

To deal efficiently with these matters the constant vigilance of the sanitary officer is called for, and it seems to me that no permanent remedy is possible at present, nor until a complete change in the habits of those who dwell in these lower class barracks has been brought about.

Aerated Water Factories.

These are situated in various parts of the town. In the course of the year nine aerated factories were discontinued. Apart from general sanitary inspection and dealing with nuisances under Ordinance 187, this department has no special powers with regard to these factories.

The aerated water industry is now established on a firm basis and, from being a luxury not many years ago, when there were probably only two factories in the town, the consumption of "cool drinks" has become so widespread as to be almost a necessity, and the cost of drinks has been reduced so as now to be within the purchasing range of the poorest of the population.

Besides the large and better class establishments, which were on inspection found to be well and cleanly conducted, there are numbers of smaller places, in which the turnout from day to day is inconsiderable, which supply the aerated water carts now so familiar about the streets, and in which meticulous attention is not bestowed on cleanliness in the detail of manufacture and the purity of ingredients.

The registration and licensing of all aerated water factories in the same manner as cowkeepers and milk vendors is called for in the interest of the public health.

ORDERS OF THE GENERAL BOARD OF HEALTH.

During the period under review two important Orders of the General Board of Health were made. They were: (1) An Order with regard to offensive trades. (2) An Order with regard to ventilation and overcrowding in dwelling-houses.

(1) *Order with regard to Offensive Trades.*—This Order was brought into force specially to deal with the curing of hides which was being carried on in the heart of the city, and with regard to which numerous and frequently repeated complaints were received at this office from persons in the vicinity. Powers under the Ordinance enabled the sanitary inspector to order the discontinuance of any offensive trade so conducted as to be dangerous or actually injurious to health. Proof of actual injury to the health of one or more persons would seem to have been necessary to secure a successful prosecution in the event of an order of the sanitary inspector being disobeyed. It was thought injudicious, therefore, to act solely under the Nuisances Section of Ordinance 187, and it was decided to introduce the Order which was made on July 12, 1915, and came into force on October 1, 1915.

Two businesses previously carried on in Charlotte Street have been removed to specially erected new buildings on suitable sites at the La Basse lands east of the abattoir.

(2) *Order regarding Ventilation and Overcrowding.*—The second Order was made on December 6, 1915, and only came into operation of February 1, 1916 (i.e., in the course of the current year).

Its provisions are two, viz.: (1) That on the serving on the owner and occupier of certificates by the sanitary inspector of unfitness of any room or part of a house for human habitation, the room, &c., shall be vacated within six days. (2) The minimum space allowable for each person in an inhabited room shall be 300 cubic ft., and the area of the ventilating openings in addition to usual doors and windows shall amount to one-tenth of the floor space.

The operation of this Order will no doubt result in lasting and perceptible good, more especially in the dwellings of the poorer class. For a number of years, under Dr. Dickson's instructions, attempts had been made to advise house-owners to improve the ventilation of the worst types of dwellings. The result had been very disappointing, and only a show of doing something resulted in a few cases, for the reason that there was no power to enforce the structural improvements that were considered necessary.

Prosecutions.—Under the anti-mosquito or yellow fever regulations 102 persons were prosecuted and 101 convictions were obtained.

For breaches of the Public Health Ordinance 187, mainly non-compliance with orders by the sanitary inspector regarding statutory nuisances on premises, there were eighteen persons prosecuted and sixteen convictions obtained.

For infringement of the Plague Regulations with regard to the protection of rat food in retail shops, ten prosecutions were laid and ten convictions obtained.

For breaches of the Order of the General Board of Health regarding the cleaning, &c., of cesspits there were three cases with two convictions.

EXCHANGE OF DUTIES BETWEEN ASSISTANT INSPECTORS OF PORT-OF-SPAIN AND SAN FERNANDO.

On the recommendation of the Surgeon-General, His Excellency the Governor approved of the transfer to San Fernando for a period of six months from August 1, 1915, of Assistant Sanitary Inspectors Carr, Johnson, and Solomon in exchange for Messrs. Haynes-Saul, Nurse, and Taylor, the latter officers being transferred to Port-of-Spain.

The change has proved to be very beneficial in every way. San Fernando from August 1, 1915, has had the benefit of the services of three energetic and capable sanitary officers trained in modern sanitary methods by Dr. Dickson.

The results of their work in the southern borough were immediately noticeable, especially as they were relieved on your suggestion of a considerable amount of the poor relief work which formerly consumed a large part of the time of the permanent assistant sanitary inspectors.

The assistant sanitary inspectors from San Fernando have been acquiring useful practical knowledge of sanitary methods in Port-of-Spain, which they will be in a position to apply efficiently on their return to their substantive posts in San Fernando.

I have once more to put on record the expression of my appreciation of the work—both routine and special—carried on by the staff under my immediate control. Their work is set out in full detail in Appendices F, G, H, and J, which, I venture to think, clearly demonstrate that a large amount of sanitary work is regularly performed in the town, the results of which are evident on all sides.

APPENDICES.

The following are appended to this report. Appendix A: Summary of deaths from principal diseases, April to December, 1915. Appendix B: Mortality in Port-of-Spain, April to December, 1915. Appendix C: Return of infantile mortality, April to December, 1915. Appendix D: Table showing particulars of cases of enteric fever notified in Port-of-Spain, April to December, 1915. Appendix E: Chart showing number of cases of enteric fever reported each month during the calendar year, 1915. Appendix F: Summary of sanitary services performed in Port-of-Spain during April to December, 1915. Appendix G: Return of prosecutions, April to December, 1915. Appendix H: Total number of rats caught each month, April to December, 1915. Appendix I: Return of rats examined for plague, April to December, 1915. Appendix J: Return of mice caught, April to December, 1915. Appendix K: Order of the General Board of Health regarding offensive trades. Appendix L: Order of the General Board of Health regarding ventilation and overcrowding.

PRINCIPAL DISEASES.

SUMMARY OF DEATHS IN PORT-OF-SPAIN DURING THE PERIOD APRIL TO DECEMBER, 1915.

	Total deaths April to December	Rate per 1,000
GENERAL DISEASES:		
Enteric fever	48	·98
Malaria	24	·49
Influenza	3	·06
Dysentery	46	·94
Leprosy	3	·06
Tetanus	16	·33
Diphtheria	1	·02
Tuberculosis (all forms)	176	3·6
Pulmonary tuberculosis	155	3·2
Syphilis	20	·41
Cancer and other malignant diseases	35	·72
DISEASES OF THE NERVOUS SYSTEM:		
Simple meningitis	7	·14
Cerebral hæmorrhage, apoplexy	32	·65
DISEASES OF THE CIRCULATORY SYSTEM:		
Cardiac and valvular diseases	63	1·3
DISEASES OF THE RESPIRATORY SYSTEM:		
Bronchitis and broncho-pneumonia	75	1·5
Pneumonia	25	·51
DISEASES OF THE DIGESTIVE SYSTEM:		
Diarrhœa and enteritis	173	3·5
Ankylostomiasis	14	·29
DISEASES OF THE GENITO-URINARY SYSTEM:		
Nephritis (Bright's disease)	104	2·1
DISEASES OF THE PUERPERAL STATE:		
Puerperal fever	4	·08
Puerperal eclampsia	7	·14
OLD AGE	72	1·5
AFFECTIONS PRODUCED BY EXTERNAL CAUSES:		
Burns and scalds	9	·18
Accidents and injuries	6	·12
Execution—hanging	6	·12

C. F. LASSALLE,
Acting Assistant Medical Officer of Health.

HEALTH REPORT, COLONY OF TRINIDAD AND TOBAGO, APRIL TO DECEMBER, 1915.

Rainfall.—The average rainfall for the calendar year 1915, based on records from 102 stations, was 68·54 in.

Vital Statistics.—The estimated population at the middle of August, i.e., midway between April 1 and December 31, 1915, was 361,811.

This figure is not properly comparable with any figure in past reports, as the mid-year population was in previous financial years estimated on September 30.

The principal causes of death in order of numbers were as follows: Diarrhœa and enteritis, malaria, tuberculosis (all forms), pulmonary tuberculosis, dysentery, bronchitis and broncho-pneumonia, old age, pneumonia, cardiac disease, ankylostomiasis, enteric fever, leprosy, puerperal fever, whooping-cough, influenza, croup, diphtheria.

Communicable Diseases.—There was no epidemic outbreak of any infectious diseases during the period April to December, 1915.

Enteric or typhoid fever prevailed in various parts of the Colony. Even without compulsory notification, a fair number of cases were reported by the district medical officers during the nine months.

A brief reference to some of the important operations may be of interest.

Abdominal Hysterectomy for (1) *Uterine Fibroids.*—Four sub-total hysterectomies were performed for fibromyoma of the uterus with successful results.

(2) *Rupture of Uterus.*—Two multiparæ who had been in labour for a considerable time at their homes were brought to hospital in the second stage of labour with transverse presentations and rupture of the uterus. Abdominal section was performed on each case and the uterus extirpated. One case ended fatally.

(3) *Cancer of the Uterus.*—Panhysterectomy, including removal of ovaries and tubes and dissection of an enlarged gland from the left lateral pelvic wall, was performed on one case for cancer of the womb. The patient was discharged apparently cured thirty-six days after the operation, but she has since returned with signs and symptoms of early recurrence of the disease in the scar of the vaginal vault, and has had to be re-operated upon.

Abdominal Myomectomy.—This operation was undertaken for the removal of a pedunculated fibroid of the uterus complicated by a parovarian cyst, which was incised and drained. The patient made a good recovery.

Ovariotomy.—Four ovariotomies for ovarian cysts of various sizes were performed with complete recovery in each case. In two of the cases the tumours were twisted on their pedicle.

Salpingo Oophorectomy.—(1) This operation was undertaken to relieve a patient who was suffering from hæmorrhage due to rupture of an ectopic sac. General peritonitis followed, resulting in the death of the patient three days later. (2) In a case of hæmato-salpinx the tube and ovary on the left side were removed with a successful result.

Laparotomy for (1) Intestinal obstruction due to:—

(*a*) *Volvulus.*—Two cases were operated upon for this condition. In one case several coils of small intestine were twisted upon the mesentery apparently the result of an injury to the abdomen; in the other the torsion affected the sigmoid flexure. Uneventful recovery ensued in both cases.

Colonial Medical Reports.—No. 73.—Trinidad and Tobago (*continued*).

(*b*) *Intussusception.*—An ill-nourished woman, aged 30, was admitted apparently in an almost moribund condition with signs and symptoms of intestinal obstruction. On opening the abdomen it was found that she was suffering from peritonitis and a large intussusception involving the cæcum and a portion of the ileum into the ascending colon. This was reduced, but the patient died a few hours after the operation.

(*c*) *Obstruction by Meckel's Diverticulum.*—In this case the general condition of the patient only permitted the formation of an artificial anus to relieve the obstruction, and the patient succumbed on the following day.

(*d*) *Obstruction caused by Bands of Adhesions.*—Three cases were admitted in a critical condition with signs and symptoms of intestinal obstruction. On opening the abdomen the cause was found to be due to bands of adhesions. In one case it became necessary to do an enterectomy for removal of gangrenous gut three days after the primary laparatomy had been performed for the relief of the obstruction. Operation in these cases was not attended with success.

(*e*) *Internal Strangulation of Bowel due to an Inguinal Hernia reduced "En Masse."*—A resection was made to get rid of gangrenous bowel and an end to end anastomosis effected by means of Murphy's button. The patient made a good recovery.

(2) *Perforated Typhoid Ulcer.*—A boy, aged 9, was admitted desperately ill with enteric fever and perforation of a typhoid ulcer. Abdominal section was performed and the ulcer closed. Improvement quickly followed; a fæcal fistula resulted, but this was closed by subsequent operation, and the patient was discharged well.

Appendicectomy.—This operation was undertaken for the radical cure of three acute cases of appendicitis and one of chronic appendicitis in the quiescent stage. All made splendid recoveries.

Cholecystotomy.—The gall-bladder was incised and drained successfully for cholecystitis in two instances. The gall-bladder in each case was greatly distended with fluid, and in one case dense adhesions complicated the condition.

Splenectomy.—A man, aged 43, was admitted with a history of a fall from a height of 7 ft., and evidence of serious internal injury. Laparotomy revealed extensive laceration of the spleen and hæmorrhage into the peritoneal cavity. The spleen was removed, but the case ended fatally one and a half hours after operation.

Exploratory Laparotomy (*a*) *for Carcinoma of the Pylorus.*—Owing to the extent of the cancerous growth and the involvement of neighbouring organs it was not deemed advisable to attempt its removal. There was also general purulent peritonitis due to leakage from perforation of the duodenum. The patient died seventeen hours after the operation.

(*b*) *Sarcoma of the Suprarenal Capsule.*—On opening the abdomen it was found that the case was inoperable and complicated by purulent peritonitis. The abdominal wound was accordingly closed, a tube being left *in situ* for drainage. Death followed a few hours after operation.

(*c*) *Cancer of the Uterus.*—Abdominal section was performed with the view of removing the womb, but owing to the involvement of the bladder in the malignant growth the operation was discontinued. Both tubes, however, were divided and ligatured with the ovarian vessels.

(*d*) *Uterine Fibroid.*—Laparotomy in this case revealed a gravid uterus which apparently complicated a submucous fibroid. No external tumours were seen. In the circumstances it was decided not to proceed any further with the operation, and the abdomen was closed.

Liver Abscess.—Five cases were operated upon, one by direct incision and drainage and four others by means of Manson's trocar and cannula. One of the latter died.

R. Seheult,
Resident Surgeon.

The Colonial Hospital, San Fernando, for the Nine Months ending December 31, 1915.

The *chief diseases* admitted and treated during these nine months were: Ankylostomiasis, venereal diseases, dysentery, malarial, ulcers. *Respiratory diseases* (exclusive of tubercular): Chronic nephritis, abscess and cellulitis, cirrhosis of liver, wounds, tubercular disease, enteric fever.

Surgical Operations.—Exclusive of the minor operations performed in the surgery there were 1,017 performed. In eleven of these cases operative treatment failed to avert a fatal issue.

Brief reference is made of the following cases which are of interest:—

Acute Hæmorrhagic Pancreatitis.—A fat woman, aged 46, was admitted to hospital with a history of acute intestinal obstruction of two days' duration associated with collapse. Her pulse was feeble, and she had acute abdominal pain with vomiting. Under chloroform, her abdomen was opened and found to contain bloody effusion, with fat necrosis of the omentum and mesentery. The pancreas was hæmorrhagic. The abdomen was drained. Her general condition never improved, and she succumbed on the following day. This condition is one of great rarity and with a high mortality.

Laceration of Spleen.—A boy, aged 9, was admitted to hospital with a history of having fallen from a tree half an hour previously. He exhibited symptoms of an "acute abdomen" with signs of progressive internal hæmorrhage. Laparotomy, under chloroform, was performed, and a collection of blood found in the peritoneal cavity, the source of which was apparently the spleen. No other viscus was injured. It would appear that splenectomy was not considered advisable in view of the fact that there was no rent in the spleen. The abdomen was therefore washed out, adrenalin applied to the region of the spleen, and closed.

The patient made a good recovery.

Intestinal Obstruction (Bands).—A moderately well-nourished man was admitted with symptoms of intestinal obstruction. Appendicectomy with drainage of the abdomen for general peritonitis had been performed eight months previously, and from this he had made a slow recovery. Under chloroform, laparotomy revealed numerous adhesions between the coils of intestines and parietes, several of which were constricting the gut. The adhesions were separated and the obstruction relieved, but without averting death.

Suppurative Appendicitis with Subdiaphragmatic Abscess.—An anæmic man, aged 38, subject to ankylostomiasis, was admitted to hospital with a large appendix abscess in the right iliac region, which was incised and drained. A second abscess, which was situated below the diaphragm, was similarly treated, but death eventually resulted. This case is of interest in being of the retrocæcal variety, where perforation had occurred resulting in the formation of a subdiaphragmatic abscess upwards behind the liver.

Strangulated Inguinal Hernia with Localized Gagrene treated by Invagination.—A well-nourished man, aged 30, was admitted to hospital with a strangulated inguinal hernia. On exposure of the gut in the hernial sac it was found that a small area, size of a threepenny piece, was gangrenous. This was treated by invagination and the wound was closed, the patient making an uninterrupted recovery.

Rupture of Small Intestine (Traumatic).—An old man, aged 69, was admitted to hospital with the history of having been struck on his abdomen with a stick. The symptoms pointed to serious intra-abdominal injury. The patient's chance of recovery was greatly lessened by his refusal of immediate operation. On opening the abdomen a rupture of the small intestine was found; it was closed by suture and the abdomen washed out, but the patient's general condition never improved.

Tubercular Peritonitis.—A woman, aged 28, was admitted to hospital with signs of general peritonitis and a tendency to intestinal obstruction. Laparotomy revealed the presence of tubercular peritonitis with many adhesions; the majority of these were separated, the peritoneal cavity washed out with saline solution, and the patient left hospital with her symptoms relieved.

Ovarian Cyst Marsupialated.—An East Indian, aged 48, was admitted with a large abdominal cyst. Under chloroform, the abdomen was opened, and a large ovarian cyst found situated on the left side. As it was too intimately adherent to intestines to allow of its enucleation, it was sutured to the abdominal wall, and treated by incision and drainage with a successful result.

Ovariotomy for Ovarian Cyst and Salpingectomy for Pyo-salpinx.—A woman, aged 32, was admitted to hospital with a large abdominal tumour and irregular fever. Under chloroform the abdomen was opened, and found to contain a large multilocular ovarian cyst on the left side and a pyosalpinx on the right. The cyst was enucleated and removed. The right tube, with its purulent contents, was ligatured, excised, and a drainage tube left in *per vaginam*. This patient's convalescence was somewhat protracted by the persistence of a sinus, which ultimately completely healed.

Hydrocele of the Canal of Nuck.—A stout woman, aged 50, was admitted to hospital with a strangulated *inguinal* hernia on the left side, and a "hydrocele of the canal of Nuck" on the right. Under chloroform the hernial sac was opened, and as about 2 in. of the gut was gangrenous it was excised, the gut reunited and reintroduced into the abdominal cavity. As there appeared to me some doubt with regard to the nature of the swelling on the right side, it was cut down upon, and found to be the rare condition of a "hydrocele of the canal of Nuck." The "inguinal" type of hernia is considered to be the most uncommon in the female, but such has not been my experience. This patient made a good recovery.

A Case of Bicornuate or Double Uterus.—The condition described below is one of such extreme rarity that the only reference to it I can find is that of a diagram in Jellett's "Gynæcology," showing it as a possibility.

A young East Indian girl, aged 14, married, was admitted to hospital with the history of a painful swelling in her lower abdomen and slight pyrexia. Her menstrual function had been regular but scanty. On examination, a tumour was found incorporated with the uterus, and in addition a cystic swelling in the right broad ligament. A sound passed through a patent cervix, which was smaller than usual, could easily be palpated between the layers of the left broad ligament. Under chloroform her abdomen was opened, and she was found to have a double uterus. The cervix with the patent os belonged to the left horn, the lumen of the Fallopian tube on that side being larger than usual. The right uterus was greatly distended (about the size of a two and a half months pregnancy) with retained menstrual fluid. The outer third of the right tube was dilated, size of a tennis ball, into a cystic collection of the same fluid, being shut off from the collection in the right uterine cavity by a constriction. There was complete atresia of the external os to the cervix belonging to this half of the uterus. Both ovaries were normal. The dilated portion of the right tube, with cystic swelling, was ligatured and excised, and the abdomen closed. Through the vagina an incision was then made to the right of the patent os into the right cervical canal, and the right uterine cavity was drained of its contents. Within a few days the swelling and all her symptoms completely disappeared. Since leaving hospital the patient has improved greatly in health.

In view of the liability of the artificial cervical opening to close, and the possibility of pregnancy occurring in the left horn, the removal of the double uterus appeared to me to have been the safest course to have adopted; but, as the patient, who is young and recently married, would not consent to such a radical measure, I had to adopt the procedure as described above. She is meanwhile being kept under observation.

E. A. Turpin,
Resident Surgeon.

Treatment of Leprosy with Hypodermic Injections of Chaulmoogra Oil Mixture.

In March, 1915, on the suggestion and with the active co-operation of Dr. Lassalle, a beginning of the treatment was made in a series of cases. The treatment was continued up to the end of November, 1915. It had been attended with very encouraging results in the Philippine Islands.

The following is a short summary of a report by V. G. Heiser, Director of Health, Philippine Islands, printed in the U.S.A. Public Health Weekly Report on October 16, 1915:—

The mixture—

Chaulmoogra oil	60 c c.
Camphorated oil	60 c.c.
Resorcin	4 grm.

Mix and dissolve with the aid of heat on a water bath and then filter.

Details of Treatment.—The injections are made at weekly intervals in ascending doses.

The initial dose is 1 c.c., and this is increased to the point of tolerance.

Much difference exists among patients as to the amount of mixture which they are able to take. In some cases there may be marked reaction after a dose of a few cubic centimetres, and it is better in such cases to reduce the amount of the dose and give it at more frequent intervals.

Quicker results are apparently obtained when it is possible to inject the mixture into large leprous deposits or to divide the dose by injecting it into a number of smaller infiltrations.

Saline purgatives are freely employed.

Two per cent. hot sodium bicarbonate tub baths are prescribed every other day.

Those who take prolonged baths regularly seem to improve more rapidly than those who do not.

It will be observed from the above that up to the present the treatment cannot be said to have had a fair trial at this asylum.

The same difficulty with regard to all other new methods of treatment was encountered in this: Some of the patients, after receiving one or a few injections, refused to allow any further application of the treatment.

It is difficult, nay, impossible in many cases to make patients appreciate the fact, that to do any good for their disease—one so chronic and intractable—any kind of treatment must be persevered in for at least two years.

If no improvement is visible after one or two applications, the treatment is immediately said to be useless.

There was a very unfortunate coincidence which discouraged most of the patients who were undergoing treatment.

Case No. 7 on June 16, within a minute of having received his eighth injection (10 c.c.), had a typical epileptic seizure. There had been no previous history of fits of any kind, and the injection and the attack were naturally looked upon in the nature of cause and effect by the other patients. It took a good deal of patience and coaxing to convince them of the error of that view.

The numbers presenting themselves for treatment subsequently were very small.

The treatment of Case No. 7 was at his own urgent request resumed on September 8. After September 29 he could not be persuaded to allow further injections.

Saline purgatives, mist. alba and sodium sulphate, 2 dr. to the ounce, were freely administered during the whole course of the treatment.

The important adjuvants of the treatment, viz.: Bicarbonate of soda baths were unfortunately not employed in any of the cases, and this may possibly account for so few of them showing any sign of improvement.

Kind of oil used: The Chaulmoogra oil used in all the cases was obtained direct from India, and was genuine.

The following cases undoubtedly showed more or less improvement during the course of treatment:—

In one case, aged 10, a tubercle of the chin disappeared rapidly after injection into it, and was replaced by a small brownish mark.

Apart from four cases in which there were swellings, and in two cases abscesses at the site of injection, no untoward effects of any kind were observed. Even with the large injections of 10 c.c. the limit of tolerance did not appear to have been reached in any case in so far as general effects were concerned.

On the results obtained up to the present no conclusions can be based as to the effect of the treatment.

The series dealt with in the Philippines includes twelve cases, and the period during which the treatment was regularly applied was in every case about two years.

The net results obtained were as follows:—

Apparent cures	11·11	per cent.
,, clinical recoveries	44·44	,,
Showing marked improvement	33·33	,,
,, slight evidence of improvement ...	11·11	,,

It may be well to quote the conclusion arrived at by Surgeon V. G. Heiser with regard to this method of treatment.

He states as follows:—

The present stage of the development of the treatment herein described does not warrant a claim that anything like a specific for leprosy has been found, but experience does show that it gives more consistently favourable results than any other that has come to our attention, and it holds out the hope that further improvement may be brought about. It produces apparent cures in some cases, causes great improvement in many others, and arrests the progress of the disease in almost every instance. We have on hand at present over twenty persons who have become microscopically negative since they began the treatment. The treatment is apparently equally efficacious in all forms of the disease—that is, the tubercular or hypertrophic, the anæsthetic, and the mixed. A series of cases is now undergoing the treatment for the purpose of more accurate study of its effect in the different forms of the disease and whether any difference exists as to sex.

Experience also shows the great desirability of further trial in the hands of other workers in different parts of the world, with the hope that improvements may result. Finally, it is always important to remember that there are many treatments for leprosy, which apparently cause some improvement, and it not infrequently happens that when cases of leprosy are placed under better hygienic conditions and have hospital care, or for other reasons not understood the disease is often arrested, in a few instances improvement results, and that apparent cures may take place without any treatment.

It is proposed shortly to resume the treatment at the Cocorite Asylum, not omitting the bicarbonate of soda baths. A selection of cases—males and females—will be made, and an attempt will be made to submit to treatment only such of the inmates as are willing and patient enough to undergo the extended course for a period of at least two years.

From the experience in the Philippines, one may safely conclude that this treatment is of great value in some cases.

Colonial Medical Reports.—No. 74.—Commonwealth of Australia.

COMMITTEE REPORT CONCERNING CAUSES OF DEATH AND INVALIDITY IN THE COMMONWEALTH.

REPORT ON TUBERCULOSIS.

(*Issued September*, 1916.)

Introductory.

Before entering on a study of the statistics of tuberculosis in Australia, it is advisable to note the main features of the history of the disease in England and Wales. In his Report for 1906 the Registrar-General stated that in the forty years from 1866 to 1905 the mortality had fallen to just one-half, and that there had been a singular uniformity in the fall.

In 1865 Villemin's experiments on the inoculation of tubercle from human sources into laboratory animals gained earnest attention, but they were not entirely satisfactory, and many investigators stated that tubercle was not due to a specific virus. It was not till 1882 that Koch published his discovery of the tubercle bacillus, and proved that the bacillus was the essential cause of the disease. Without the bacillus there is no tubercle. For many years this new truth, now universally accepted, was doubted, or only believed in part, so that it was not till a later date that the public, or even the administrators of public health, grasped the full meaning and importance of the facts which Koch had so completely demonstrated. Hence we may say that during the first half of the period in which the tubercle rates were falling in England and Wales, there was no active general belief that tubercle is an infective disease, always derived from some pre-existing case. Nevertheless, as will be shown later, some important factors in the diminished prevalence of tubercle depended on segregation of the sick and lessened exposure of the healthy.

Dr. Newsholme, in his Report as Medical Officer of the Local Government Board for 1910-11, summarizing the history of the fall of tubercle mortality in England and Wales, wrote as follows:—

"It is evident that this decline has been associated with an improving social and sanitary condition of the people. In addition to more efficient medical attendance than in the past, these improvements have meant better housing, less unhealthy conditions of occupation, more wholesome and more abundant food and clothing. These influences in the aggregate have insured increased resistance to the infection of tuberculosis. They have probably even more insured diminished facilities for infection. The close association between bad housing and excessive tuberculosis is well known. Hence the importance attaching to the work of the Board and of local authorities under the Housing Acts . . . ; to the efforts to prevent overcrowding in houses, to remedy defective lighting and ventilation, to prevent permanent dampness in houses, and to diminish and prevent future congestion of houses on area. Improved housing doubtless increases the resistance to tuberculosis; still more it implies diminished opportunities for infection."

Colonial Medical Reports.—No. 74.—Commonwealth of Australia (*continued*).

Dr. Newsholme proceeds to analyse three ways in which opportunities for infection are being diminished in the homes of the people:—

(1) The provision of better houses implies more room and more rooms, enabling separate sleeping accommodation for adults and children, and for the weakly and the healthy, to be obtained to a greater extent.

(2) The habits of the people have immensely improved in two important respects. Spitting is seldom indulged in at home. The spittoon has disappeared from private houses. The average worker's house is kept cleaner than in the past, and the harbouring and transmission of infection are thus prevented.

(3) A much more completely separate treatment of the sick is now secured than has ever been practised in the past. In London, in 1910, over 56 per cent. of the total male deaths from phthisis, and over 46 per cent. of the total female deaths from phthisis, occurred in public institutions, the average aggregate stay in these institutions of each patient covering the most serious period of his sickness.

Hence the towns share in the general improvement in the tubercle rate, and the average urban rate is approaching closely to the average rural rate.

Dr. Newsholme lays stress on the general conclusion that, apart from infected food, tubercle bacilli in effective dosage are present chiefly in the immediate vicinity of consumptive patients who are careless in their habits.

TUBERCULOSIS IN THE COMMONWEALTH.

During 1914 there were 3,574 deaths from all forms of tuberculosis within the Commonwealth, or 72·6 per 100,000 of population. The deaths from pulmonary tuberculosis were 3,111, or 63·2 per 100,000 of population.

The Australian rate for all forms of tuberculosis for 1914 is 45·1 per cent. lower, and the New Zealand rate nearly 49·8 per cent. lower than the rate for England and Wales in 1913.

The Australian rate for 1914 is 27·7 per cent. lower than that for 1905. The New Zealand rate, though lower than the Australian, has not improved in the same degree or with the same regularity. The Australian rate fell by nearly 7 per cent. from 1905 to 1908; by 11·7 per cent. from 1908 to 1911; and by 12·04 per cent. from 1911 to 1914. These results, taken by themselves, are highly satisfactory. If the total fall of 27·7 per cent. in the last ten years were repeated in the next decade, the rate for Australia in 1925 would be 52·7.

The question, however, which should properly be asked is whether the existing tubercle rate of Australia is as low as it ought to be in comparison with that of England and Wales, or that of the United Kingdom as a whole. Dr. P. C. Cowan, Inspector of the Local Government Board, lecturing at the College of Science, Dublin, early in 1916, said that about 8,000,000 men were engaged in regular occupations in the United Kingdom, and that about 1,000,000 had wages of less than 21s. a week. In 1911, 3·2 per cent. of families lived in single rooms in England and Wales, 6·4 per cent. in Ireland, and 12·5 per cent. in Scotland. In certain areas the wages are lower and the housing conditions worse than these figures would indicate. The interactions of poverty and sickness, however, are not easily comprehended. Mr. Burns, President of the Local Government Board, in an address in 1911, said that, in his opinion, 30 per cent. of the total pauperism, on which the country spent fifteen and a half millions per annum, was due to sickness alone. When they grappled with sickness, ill-health and invalidity, the bed-rock of pauperism was reached. He held that it was a sickness rather than a wages question. However this may be, your Committee is of opinion that the existing tubercle rates of Australia are unsatisfactory, in view of the ample spaces available, the separate housing of families, and the high wages current. The detailed study of tubercle rates in the various States reveals great irregularity in incidence of the disease, and great inequality of progress towards better conditions. The metropolis of a State may be improving rapidly, while the extra-metropolitan districts are comparatively stationary; or, on the contrary, the metropolis may have high rates while the extra-metropolitan districts have very low rates. Further investigation is urgently needed, so that these inequalities may be levelled down, and that tubercle in Australia, if not abolished, may be brought down to the rate that would correspond with the excellence of our opportunity.

MORTALITY DISTRIBUTION AMONG THE STATES.

Statistics show that Victoria and Western Australia have the highest death-rates from pulmonary tuberculosis. Queensland and Tasmania have the lowest death-rates, while New South Wales and South Australia occupy an intermediate position, the rates being equal in these States.

The question why Victoria should have a total rate for tubercular diseases other than pulmonary tuberculosis of 86·4, while Queensland has a total rate of only 49·6, demands serious consideration, but it cannot be discussed with advantage till the history and peculiar features of the disease in each State have been set forth, however imperfectly.

TUBERCLE IN NEW SOUTH WALES.

The total rate was high till 1885, and has fallen from 157 to 72. Pulmonary tubercle has fallen from 105 to 63, but other tubercle has fallen far more, from 48 to 9. Since 1906 the pulmonary rate has only fallen from 68 to 63, while other tubercle has continued to decline rapidly.

For the metropolis in 1885 the male rate per 100,000 was nearly 308, and the female rate about 248. In 1896 the male rate was 148 and the female nearly 122. In 1907 the male rate was 95 and the female 94. In 1914 the male rate was 88 and the female 55.

For the extra-metropolitan districts in 1876 the male rate was 100 and the female 85. The male rate rose to 134 in 1881 and again to nearly 133 in 1886, while the female rate reached nearly 108 in 1885. Then the rates fell in an irregular way to their former level, which they maintained till 1903 (male, nearly 109; female, 91), after which the rates both fell, the male rate crossing the female rate in 1908 (male, 73; female, 76). Since then the male rate has increased and the female rate has fallen, the rates in 1914 having been respectively 91 and 54.

The metropolitan rates, which were formerly far the higher, have become the lower, the improvement being marked in both sexes. The extra-metropolitan rates have not improved in anything like the same degree, the female rate being less favourably affected than the male. For the last ten years there has been very little improvement.

The maximum rates in Victoria were attained in 1887, the pulmonary rate being 153; other tubercle, 38; total rate, 191. The maximum in New South Wales was two years earlier, in 1885, but with definitely lower rates—pulmonary, 116; other tubercle, 41; total rate, 157. In 1914 the rates in Victoria were still higher than those in New South Wales, but the improvement in Victoria had been greater than that in New South Wales, especially in recent years. The pulmonary rate in New South Wales from 1906 to 1914 moved from 68 to 63, but in Victoria it fell from 98 to 72.

As we have seen, the tubercle rate for the extra-metropolitan districts of New South Wales is now higher than the rate of the metropolis. In 1914 the pulmonary rates were as follows: For the State of New South Wales, 63·6; for the metropolitan district of Sydney, 54·7; for the extra-metropolitan district, 69·1. In Victoria, for the same year, the rates were as follows: For the State, 72; for the metropolitan district of Melbourne, 89; for the extra-metropolitan districts, 56. While the phthisis rate for Sydney is far below that for Melbourne, the extra-metropolitan districts of New South Wales compare unfavourably in this respect with those of Victoria. The Sydney rate is very slightly below the extra-metropolitan rate of Victoria.

It must not be thought that the extra-metropolitan districts of Victoria have a rate uniformly lower than that of the metropolis. Bendigo, including its suburbs, has always shown a much higher pulmonary rate than Melbourne and its suburbs.

Ballarat and its suburbs have, as a rule, had a rate slightly above that of Melbourne, but in 1913 and 1914 Melbourne has shown improvement, while Ballarat has shown higher rates. In 1914 the Ballarat rate of 112 was only slightly below that of Bendigo.

Geelong and its suburbs show far less phthisis than Melbourne or Ballarat, and the rest of the State shows much less than Geelong.

TUBERCLE IN QUEENSLAND.

Here the record shows that the rates, both pulmonary and "other," rapidly rose from 1873 till 1885, till they were high above any record in New South Wales, while subsequently there was a fairly steady fall, so that the rates fell below those of New South Wales in 1906, and continued to fall absolutely and relatively till 1910, becoming decidedly the lowest rates obtaining in any Australian State. Since 1910, however, there was no further improvement until 1914, when a further decided reduction was recorded. The fall in the total tubercle rate from 262 to 49 within thirty years is phenomenal.

In Queensland, however, there is still a striking difference between the tubercle rates of the metropolitan district (10-mile radius) and the extra-metropolitan districts. In 1914 the pulmonary rate for Brisbane and its suburbs was 71, while that for the extra-metropolitan districts was 35, the rate for the whole State being 42, so that the phthisis rate for Brisbane is slightly above that of Sydney, while the extra-metropolitan districts of Queensland have a rate less than half that of the extra-metropolitan districts of New South Wales.

TUBERCLE IN SOUTH AUSTRALIA.

Here the rates have never been high, reaching a maximum of 138 for total tubercle in 1882; but improvement has been slow, and interrupted by a rise in 1908 above the rates of 1870. The rates are now not far below those of Victoria, and are higher than those of New South Wales. Victoria and even New South Wales had formerly much worse records.

TUBERCLE IN WESTERN AUSTRALIA.

Here again the rates have never been high, but for twenty years there has been no improvement. The pulmonary rate is now higher than that of New South Wales.

Concerning districts, the pulmonary rates for 1911 were as follows:—

Metropolitan	91
Central and Eastern (mining) ...	90
North and North-West	61
South-Western (agricultural) ...	25

The rates for the mining district were almost exactly identical with those of the metropolis. Those for the agricultural districts were only 28 per cent. of the foregoing.

TUBERCLE IN TASMANIA.

What has been said of Western Australia applies to Tasmania also. In recent years Tasmania has shown a lower pulmonary rate and a higher "other" rate than Western Australia.

The position may be briefly stated by saying that New South Wales, Victoria, and Queensland have in that ascending order of relative magnitude shown marked improvement in their tuberculosis condition, while South Australia, Tasmania, and Western Australia have remained practically stationary, or have shown relatively slight improvement within the last twenty years.

If some fundamental explanation of the reduction of tuberculosis in Queensland could be obtained, it would go far towards elucidating many of the problems in the control of the disease.

Statistics of Tubercle among the Living.

The preceding records apply only to the facts known concerning *deaths* from pulmonary tuberculosis. Of the number of persons still living affected with this disease not so much is known.

Payment of Pensions.

During the period November 18, 1910, to August 27, 1915, a total of 3,381 pensions were paid on account of tuberculosis, and of these 2,532 were tuberculosis of lungs.

The pensions represent only those persons permanently incapable of earning their livelihood, which means, in all probability, that the 2,532 persons were advanced cases of tuberculosis, and therefore infectious.

Cases of Phthisis Notified.

As the disease has not been notifiable in all of the States for any lengthy period, it is not possible to give very complete information concerning the distribution of the disease. The following information is, however, available.

New South Wales.

Tuberculosis of the lungs was made notifiable within the metropolis of Sydney in 1904.

By the *Public Health Amendment Act*, 1915, the disease was made notifiable in any district of the State which might be proclaimed for the purpose.

For the year 1913 there were 656 cases of pulmonary tuberculosis notified in the city of Sydney.

Victoria.

Pulmonary tuberculosis was made notifiable in the metropolitan area in 1903, in the principal cities and towns in 1905, and in the remainder of the State in 1909.

An interesting analysis of the data accumulated during two and a half years ended June, 1911, has been made by the Government Statist of Victoria (*Victorian Year-Book*, 1913-14, p. 389). These data are based upon the notifications received under the Health Act. During the period under review, 1,912 residents of Greater Melbourne, 137 of Ballarat and suburbs, 347 of Bendigo and suburbs, 71 of Geelong and suburbs, and 731 of the "rest of the State" contracted the disease.

The report rate exceeded the death-rate by 38 per cent. in the metropolis, by 17 per cent. in Ballarat, by 45 per cent. in Bendigo, by 42 per cent. in Geelong, and by 18 per cent. in the whole State. From the deficiency in the report or notification rate for the "rest of the State" it would appear that numerous cases occurring therein have not been reported to the Board of Health, or that many residents of the metropolis and of the three other large cities referred to, who contract phthisis, leave these areas and reside in country districts, where some of them subsequently die from the disease. The latter is true to some extent, but it accounts for only a portion of the discrepancy mentioned. If all cases occurring in the rural areas were notified, it is probable that the report rate would slightly exceed the death-rate.

Tuberculosis of the lungs was made notifiable in Queensland from July 1, 1905; in Tasmania from 1913; in South Australia since 1898; in Western Australia tuberculosis has been nominally notifiable since 1902.

It will be obvious that the notifications received during the years concerned cannot be accepted as representing the total number of cases in the community during any one year. Cases will still be alive which had been notified during the preceding year, cases will escape notification, and other such causes combine to render the total incomplete as an estimate of the total numbers of phthisical persons alive during any one year.

The most complete estimate on these lines was made in South Australia, where it was estimated from carefully compiled records that 457 persons suffering from phthisis were alive on December 31, 1910. If this estimate be applied to the total population of the Commonwealth, it will be found that on this ratio there would be in 1914 about 5,677 persons in the Commonwealth suffering from pulmonary tuberculosis.

In the five States, Victoria, South Australia, Queensland, Tasmania, and Western Australia, a total of 3,049 notifications was received in 1914 amongst a population of 3,073,498.

Applying this proportion to the total population of the Commonwealth, 4,940,952, an estimated total of 4,901 is obtained as the number of notifications which would have been received if the proportion in these four States had obtained throughout the Commonwealth.

On the evidence thus available, and having regard to the usual duration of life in phthisical patients, we believe that the number of living consumptive patients in the Commonwealth may be estimated as at least 6,000.

Age Distribution.

As regards Invalidity Pensions, the actual number of persons affected at different ages is most important. But in an inquiry into the causes of the disease, much more accurate information is obtained by a study of the numbers affected at any age in proportion to the number of persons living at that age.

The number of deaths from tubercle in the Commonwealth may be stated more shortly as follows without distinction of sex:—

Number of Deaths from Tubercle in the Commonwealth in 1914.

Under 10	253
10-19	244
20-29	857
30-39	799
40-49	615
50-59	478
60-69	244
70-79	70
80 and over	8
Unspecified	6

From these figures it appears that the number of deaths is greatest between 20 and 40, the maximum being attained between 25 and 29. Though the number of deaths diminishes from the age of 40 onwards, 615 lives are lost between 40 and 49, 478 between 50 and 59, and 328 after 60.

A different picture is obtained by comparing the numbers of deaths per 100,000 living at each age period. The age distribution of the population is far more certain in the census years than in intermediate periods, and for this reason we have used the statistics of 1911.

Average Mortality Rates (1909-1913) from all Forms of Tubercle per 100,000 Living at each Age Period in the Commonwealth in 1911.

Age period	Male	Female	Total
Under 5	48	43	46
5-9	13	13	13
10-14	14	20	17
15-19	37	68	52
20-24	73	113	93
25-29	111	135	123
30-34	126	121	123
35-39	140	120	130
40-44	148	103	125
45-49	168	94	131
50-54	171	73	122
55-59	185	82	133
60-64	179	91	135
65-69	157	91	124
70-74	137	73	105
75-79	74	41	57
80 and over	41	39	40

This table shows that the total mortality from tubercle per 100,000 living at each age period rises till 35-39, then fluctuates till it attains a slightly higher point between 60 and 64, the rate being higher from 70 to 74 than between 20 and 24. The full meaning of these figures, however, cannot be grasped until the sex distribution has been studied.

According to Dr. John Brownlee (Society of Medical Officers of Health, January 14, 1916) there are three types of pulmonary phthisis—one specially affecting young adults and attaining its maximum between 20 and 30; a second affecting chiefly persons of middle age, with its maximum between 40 and 50; and a third affecting persons in more advanced age, with its maximum between 60 and 70. Shetland and Ireland give the first type almost pure, London gives the middle type. The curve of the coal miners gives the third type. As a rule, the general curve is made up of the three types in varying proportion, but there are curious exceptions in addition to those above mentioned. South Wales has no middle-age phthisis, while Lancashire has practically nothing but the middle-age type. In England as a whole there has been a rapid and continued fall in young adult phthisis since 1860. Probably there had been an increase from 1840 to 1860. In Ireland, phthisis among persons between 20 and 30 years has steadily increased since 1851-60, and it would appear that a decline is now setting in.

The explanation of these variations is more problematical. Brownlee finds that the young adult type spreads equally in healthy and unhealthy districts, while the middle-age type is more deadly in proportion as general health is depressed. He thinks that early and late phthisis may be one disease and middle-age phthisis another disease.

Some such distinctions of type are, in our opinion, essential to the understanding of tubercle in the Commonwealth, but we regard Dr. Brownlee's explanations as unproved hypotheses. In our opinion, pulmonary tuberculosis is probably one disease, but with varying incidence and prevalence according to the amount of exposure to infection, and the surrounding conditions making for increased or diminished resistance. Pulmonary tubercle in the Commonwealth probably includes all the three types, and we shall consider the subject further in connection with sex distribution.

Phthisis in elderly persons usually runs a very chronic course. In the young it is often rapid, and even when slower in its evolution it often presents marked exacerbations, during which progress is accelerated. In considering relative mortalities, therefore, it must be remembered that the number of patients in middle and advanced life is relatively larger than the number of deaths would indicate.

Age Distribution of Human Cases amongst the Living.

Pensions.

During approximately five years, 1910-1915, pensions were paid on account of phthisis to 2,532 persons.

The only information available concerning the ages of cases notified under various Health Acts is that for Western Australia. In that State 353 cases were notified during the year 1914.

Sex Distribution.

The following table shows the sex distribution of deaths from tubercle in the Commonwealth in 1914:—

	Pulmonary tubercle	Other tubercle	Total tubercle
Males	1,853	269	2,122
Females	1,258	194	1,452

Per 100,000 of each sex, the rates for total tubercle in the last census year (1911) were: Males, 88; females, 78; and in 1913: males, 85; females, 73.

Colonial Medical Reports.—No. 74.—Commonwealth of Australia (*continued*).

For the several States in 1913 the total death-rates from tubercle per 100,000 of mean population were as follows:—

	Males	Females	Male rate in percentage of female
New South Wales	88	67	131
Victoria	89	85	104
Queensland	69	49	141
South Australia	86	94	91
West Australia	89	54	165
Tasmania	68	80	85

The female rate exceeded the male decidedly in Tasmania, and to a less degree in South Australia. The male rate exceeded the female slightly in Victoria, decidedly in New South Wales, still more in Queensland, and even more in Western Australia.

In Queensland, startling results are obtained by comparing the tubercle mortality rates per 100,000 of each sex in 1914, as the following table shows:—

The respective populations are as follows:—

	Males	Females
State of Queensland	364,526	312,181
Metropolitan District	75,295	78,716
Extra-metropolitan Districts	289,231	233,465

It must be remembered that the extra-metropolitan districts include such centres of population as Rockhampton, Maryborough, Toowoomba, and Townsville.

In Queensland, therefore, the female rate throughout is only half the male rate. The male and the female rates are twice as high in the metropolitan districts as in the extra-metropolitan districts. In the latter the female rates are as follows: Pulmonary, 21·8; other tubercle, 3·8; total tubercle, 25·6.

In New South Wales in 1908 the male and female phthisis rates were nearly equal.

We have already shown that in the metropolitan district of Sydney there has been marked improvement both in males and in females, the sexes now suffering equally; whereas in the extra-metropolitan districts there has been relatively little improvement, especially in females.

In New South Wales the rates have improved much more rapidly in females than in males. In Victoria the rates for both sexes are relatively high, but, as in New South Wales, the female rate has shown greater decrease than the male.

Age Distribution of Tubercle Mortality in Males and Females.

Disregarding cases under 15, we find that both male and female rates rise rapidly from 15 to 30, but in this period the female rate is much the higher. The male rate continues to rise till 40, while the female rate falls slightly. Subsequently the male rate rises high above the female to reach its maximum of 185 between 55 and 59, while the female rate, which reached its maximum of 135·5 between 25 and 29, falls to a temporary minimum of 73·6 between 50 and 54. Subsequently the male rate falls, but more rapidly after 70 than before, while the female rate rises to 91 between 60 and 70, the male and female rates coming close together after 80 at a level of about 40.

These facts may be stated shortly with some degree of probability in terms of Dr. Brownlee's classification. In females there is a high early wave of tubercle, reaching its maximum about 30; the wave of middle life is only feebly marked; and the wave of later life, though very definite, is much less strong than the early wave. In men all three waves are strongly marked. The early wave is less high than that in females; but the middle and late waves combine to give a high maximum between 55 and 59. Over 80, male and female curves are close together at a relatively low level.

The tendency to tubercle is governed by exposure to the bacillus and by individual resistance to infection. In the period 15-30 woman suffers much more than man. After 30 men begin to fall victims more than women. At 50-54 the death tax is falling heavily on the males, while it has receded in the females. The male maximum is reached at 55-59, the female rate now rising slightly. During the next ten years the male rate is falling, while the female is rising or stationary. After 70 both rates fall. The great contrast is between the female rate of 73·6 at 50-54, and the male rate of 185 at 55-59.

If we review the history of tubercle for fifty years, we find that great changes have occurred in the age incidence in the two sexes. For this purpose we take the statistics of pulmonary phthisis in Victoria as given in the *Victorian Year-Book* for 1914-15. It must be remembered that the general male rate for phthisis rose to a maximum in 1881-1891, and then fell, while the general female rate has fallen since 1861, the steady fall being broken only by a more marked drop in 1871. The history of phthisis in Victoria is in sum as follows:—

In 1861 females suffered more than males. Women had their maximum from 25 to 55, while men reached their maximum more slowly at 55 to 65. Women had a strong early and middle wave and only a weak late wave, while men had a strong middle and late wave.

In 1871 the rates for both men and women had fallen, but the male rate had passed above the female. The early wave was increasing in intensity in both sexes, but the middle and late waves falling rapidly in women and the late wave was accentuated in men.

In 1881 the female rate was above that of 1871, but below that of 1861. The male rate showed a decided rise even above 1861. The early wave had become still more dominant in women, while all three waves were marked in men, with two maxima at 25-35 and at 55-65.

In 1891 the female rate was falling, but the male rate still rising. In females the early and middle waves were dominant, the early wave being less abrupt. In males the middle and late waves increased, and with a diminishing early wave brought a maximum of nearly 365 per 100,000 between 55 and 65.

In 1901 the male rate was falling, but was 135 as compared with the female rate of 97. The female curve was more homogeneous, with a high middle part, the maximum lasting from 25 to 45, with a slight increase in the second of these decades. The male caught the female at 25, and then soared up to 357 at 55-65, while the female rate was dying away.

In 1911 both rates had fallen. The early female wave showed only slight improvement, the rate between 20 and 25 being practically unchanged; but the middle and late waves were falling away. The female maximum of 140 lay between 25 and 35. The early male wave was disappearing, but the middle and late waves, though vastly improved, were still relatively marked, the maximum of nearly 189 lying between 55 and 65, while the female rate at that age period was only 74·7.

The Victorian phthisis rates are still too high (male, nearly 90; female, 76), but Victoria has reason to be thankful for the great change from the conditions of 1891 to those of 1911. Special attention, however, should be paid to the conditions of life affecting the young women in that State.

OCCUPATIONAL DISTRIBUTION.

The occupations of the *male* persons who died from tuberculosis of the lungs in the Commonwealth are classified for the year 1914 as follows:—

Professional, 93; domestic, 90; mercantile pursuits, 306; transport and communication, 155; industrial—manufacturing, 212; building and construction, 101; others, 340; primary producers—agricultural, 128; pastoral, 43; mining and quarrying, 193; others, 9; independent means, 18; dependent, 79; unspecified, 37; total, 1,804.

It is evident that the incidence of tuberculosis is not limited to any one occupation—mercantile pursuits and general industrial work providing the greatest numbers of deaths, while mining is fourth in order of magnitude. As the total number of males engaged in these pursuits is not known, the degree of distribution of this disease amongst the various trades cannot be stated.

This distribution does not quite correspond with the distribution obtained by arranging the *death rates* in order of magnitude. As 1911 is the only year in which the populations engaged in the various occupations are known, the *death rates* can be given for this year only, and as the published figures specify occupational distribution for males only, this sex alone can be dealt with. The following table gives the rates per 100,000 in the different groups of occupations:—

Occupation	Total population employed	Number of deaths from tuberculosis	Death-rate per 100,000
Independent means	13,939	31	222
Mining and quarrying	105,726	212	200
Domestic	48,235	87	180
Industrial	453,743	695	153
Professional	91,638	112	122
Commercial	236,499	280	118
Engaged in transport and communication	152,554	160	104
Unspecified	39,386	31	78
Agricultural	277,232	142	51
Dependent	706,773	259	36
Pastoral	143,591	35	24
Other primary producers	43,719	11	25
Total	2,313,035	2,055	88

An interesting return has been supplied by the Health Department of Victoria showing the occupations of male persons suffering from pulmonary tuberculosis who applied to the Public Health Department for admission to a State sanatorium during the period January, 1912, to December, 1915:—

Males.	
Actor	4
Agent	24
Artist	2
Baker	13
Barman	12
Billiard-marker	6
Blacksmith	21
Boilermaker	8
Bookbinder	2
Bookmaker	2
Bootmaker	72
Boundary rider	2
Brassfinisher	2
Bricklayer	19
Butcher	19
Cab-driver	6
Cabinetmaker	12
Canvasser	6
Caretaker	7
Carpenter	86
Carriage-cleaner	4
Carrier	7
Casemaker	3
Chauffeur	18
Chemist	4
Cigarette-maker	3
Circus rider	2
Clerk	140
Coachbuilder	4
Compositor	6
Confectioner	4
Cook	20
Cooper	4
Dairyman	7
Dealer	4
Draughtsman	5
Draper	17
Driller	3
Driver (engine)	29
Driver	59
Drover	9
Electrician	14
Electroplater	3
Engineer	9
Factory hand	15
Farmer	30
Farm labourer	42
Fireman	14
Fitter	7
Frenchpolisher	4
Gardener	20
Gasfitter	4
General	67
Glassworker	7
Greengrocer	4
Grocer	12
Groom	22
Hairdresser	25
Hawker	9
Harnessmaker	10
Hardware employee	2
Horse-trainer	7
Ironworker	6
Ironmoulder	5
Jeweller	8
Journalist	4
Labourer	399
Laundryman	4
Leadworker	3
Machinist	3
Mechanic	17
Medical student	3
Messenger	10
Miner	99
Musician	7
Newsagent	3
Orchardist	6
Packer	2
Painter	31
Pensioner—	
Invalid	7
Old age	4
Photographer	4
Piano tuner	5
Plasterer	5
Plumber	15
Police constable	3
Porter	15
Postman	7
Potter	3
Printer	30
Prospector	2
Quarryman	6
Railway employee	14

Railway guard	1
Railway signalman ...	3
Railway shunter ...	2
Railway train examiner	2
Rubber-worker	7
Salesman	24
S. A. officer	6
Sawmaker	5
Saw-mill hand	3
School	6
Seaman	32
Ship steward	10
Shop assistant	11
Signwriter	6
Slaughterman	2
Soldier	51
Stableboy	6
Steelworker	2
Stoker	10
Stonemason	3
Storekeeper	5
Storeman	9
Tailor	16
Tailor's presser	7
Tentmaker	5
Tinsmith	10
Tobacconist	1
Tobacco-worker... ..	17
Tram conductor ...	3
Tram employee	4
Traveller...	23
Waiter	9
Wardsman	7
Warehouseman... ...	5
Watchmaker	2
Woodturner	13
Woolworker	5
Total ...	2,067

It is noticeable that the two groups principally affected are clerks and labourers, and that the number of miners who applied was also comparatively large.

TUBERCULAR DISEASE OTHER THAN PULMONARY TUBERCULOSIS.

The statistics concerning total tubercle are more reliable than those concerning the differentiation of pulmonary tuberculosis and other tuberculosis; for cases certified simply "tuberculosis" are officially counted in pulmonary tuberculosis, and number no less than 797 in the total of 3,018.

Tubercular meningitis is chiefly a disease of early life. Of 207 deaths from this cause, 113 occurred in children under 5. Of 108 deaths attributed to abdominal tubercle, 35 were in children under 5.

For the Commonwealth as a whole there has been no diminution in the number of deaths ascribed to "other tubercle" during the past seven years. The history in the States has varied greatly.

In brief, New South Wales, Victoria, and Queensland show great improvement in their "other tubercle" rates, decidedly greater than the improvement in the pulmonary rates. The other States show little or no improvement in "other tubercle."

Special reference must be made to tuberculosis in children under 5, for this is mainly tubercle other than pulmonary, the chief causes of death being tuberculous meningitis, abdominal tuberculosis, and generalized tuberculosis. In 1914 the total number of deaths from tubercle in the Commonwealth in children under 5 was 195. In 1886 there were 428 such deaths in New South Wales alone. In New South Wales the deaths increased greatly from 1876 to 1886, when the Dairies Supervision Act was passed. Since then there has been a progressive fall, with only slight interruptions, from 427 deaths in 1888 to 85 deaths in 1915. The fall has been great both in the metropolis and in the extra-metropolitan districts; but in proportion to the number of children exposed to infection, the fall in the metropolis has been far greater. All forms of tubercle show improvement, but the greatest change in this age-period is in abdominal tuberculosis, the deaths from which from 1905 to 1908 were only 18 per cent. of the deaths from 1883 to 1886, and this, too, without considering that the annual number of births in New South Wales increased from 15,267 in 1883 to 20,853 in 1908. These facts stand out as a bright record of progress in the campaign against tuberculosis.

INVALID PENSIONS.

Pulmonary tubercle was responsible for 11 per cent. of all invalid pensions, and tubercle of bones and joints for 3 per cent. Of invalid pensions paid to persons under 40, 16·7 per cent. were in respect of pulmonary tubercle, and 7·8 per cent. in respect of other tubercle, or a total of 24·5 per cent. in respect of tubercle in any form.

SUMMARY OF STATISTICAL DATA.

In respect of tubercle, the Commonwealth compares favourably with the United Kingdom, but not so favourably as it should. In its own records there has been marked improvement, but in some of the States the tendency to improvement has recently diminished or disappeared. The most remarkable progress is seen in the tubercle of children under 5.

Great discrepancies are still present. Victoria has the highest rates, but is showing progressive improvement. In New South Wales there has been great progress in the metropolitan district, but very little during recent years in the remainder of the State. In Queensland the rates, which were once very high, have become decidedly the lowest in the Commonwealth; but the rates in Brisbane are as high as those in Sydney, while those in the extra-metropolitan districts of Queensland are very low. South Australia, Western Australia, and Tasmania show little recent progress.

The number of deaths from tubercle is greatest between the ages of 20 and 40, but in proportion to the number of persons living at each age-period the rates are highest between 55 and 59, and are higher between 70 and 74 than between 20 and 24. In the old the disease lasts much longer than in the young. The prevalence and importance of tubercle in middle life and commencing old age is seriously under-estimated.

There is a striking difference between the incidence of tubercle in males and females. In the Commonwealth as a whole the male rate per 100,000 in 1913 was 85, and the female rate 73; but taking the female rate as 100, the male rate varies from 165 in Western Australia to 85 in Tasmania.

In the Commonwealth the stress comes earlier in women than in men, and the early stress is more severe. The maximum mortality per 100,000 living at any age-period is reached in women between 25 and 29, after which the rate recedes. But in man the maximum is not reached till between 55 and 59, when the male rate is more than double the female, in spite of a slight late rise in women. Special attention must be given to the early high rise in women, and to the persistent increase in men far above the female rates in the middle and later periods of life. It must not be thought that early stress is absent in men, but it is relatively less severe. Women show evidences of late stress, but not in any degree comparable with that seen in men.

Concerning occupation, it is curious to note that those of "independent means" suffer most; those engaged in mining and quarrying head the list of workers, while it is surprising to note that the "domestic" rate considerably exceeds the industrial. Pastoral and agricultural pursuits show low rates. It must be remembered that the information is available for males only.

The death-rate for the Commonwealth for all forms of tuberculosis is 726 per million of population, and that for pulmonary tuberculosis 613 per million. The number of deaths from tubercle in 1914 was 3,574, including 3,018 from pulmonary tubercle.

A reasonable estimate on which to base practical action would be that there are at least 6,000 persons living in the Commonwealth suffering from pulmonary phthisis.

Tuberculosis is still far too prevalent. The avoidable excess represents a great loss of life and widespread invalidity. It also causes financial loss to the Commonwealth, not only indirectly in many ways, but directly by the payment of invalid pensions. Eleven per cent. of all pensions, and nearly one-fourth of all pensions paid to persons under 40 years of age, were made necessary by tuberculosis. A total of 3,381 pensions was paid on account of tuberculosis between 1910 and 1915. If pensions were paid to each individual on an average for six months (which is probably less than the average period), it appears that this disease has in five years cost the Commonwealth Government, in this way alone, approximately £44,000.

In view of these facts, your Committee submits that a campaign should be inaugurated to secure a great reduction in the mortality and invalidity caused by tubercle in the Commonwealth. Your Committee is of opinion that the ideal of complete eradication of tubercle should be taken into serious consideration. It is often said that tuberculosis discharges a useful function in weeding out the unfit. Such sayings are idle and mischievous. The incidence of tubercle is not confined to the weakly and the unfit. The strong are not exempt if the dose of infection is sufficiently large. Great numbers of the most promising young folk are swept away. The tax on early womanhood and on men in middle life is very severe. The incidence on children should be still further reduced, and the large measure of success already attained in connection with tuberculosis of children should encourage us to aim at equal results in all periods of life, and at the nearest possible approach to complete elimination of the disease.

INTRODUCTION FROM OTHER COMMUNITIES.

The Commonwealth is in an especially favourable situation for accurate information on this subject.

During the year 1914, 3,574 deaths were registered as being due to tuberculosis in all forms. These may be classified as follows:—

Born in the Commonwealth ..	2,582	or 72·2 per cent.
Resident in Commonwealth—		
20 years or over	483	or 13·5 ,,
15-20 years	31	,, 0·8 ,,
10-15 ,, ...	40	,, 1·1 ,,
5-10 ,, ...	62	,, 1·7 ,,
2-5 ,, ...	121	,, 3·3 ,,
Under 2 years...	106	,, 2·9 ,,

These figures are sufficient to establish the fact that immigration has not within recent years, at any rate, played an important part in the production of tuberculosis in the Commonwealth.

Your Committee recognizes that already certain administrative machinery is in operation by medical inspection in England, and on arrival at all ports of the Commonwealth to prevent the further introduction of infective tubercular individuals, but as your Committee considers that the idea of the complete eradication of the disease should be contemplated as being not entirely visionary, it is urged that these administrative measures be made as effective as possible for the prevention of the immigration of consumptives. Any stimulus of migration consequent upon the return to peaceful international relationships will necessitate care in this direction.

INHERITANCE.

Tuberculosis is very seldom transmitted directly from either parent to the child at any stage before birth. The notion of direct inheritance of actual tubercular disease is one which has long been popularly entertained, but precise experience and investigation have shown that cases of children having been born with the disease actually present at the time of birth are very rare. In an investigation in Copenhagen it was shown by tests that of 317 new-born infants not one was tubercular. Only fifty-one cases of undoubted congenital tuberculosis are on record; all occurred with mothers who showed exacerbations of tuberculosis during the last months of pregnancy. The popular conception of inherited infection has its origin in the numerous instances of family incidence, i.e., several members of a family developing the disease.

It is well known that some species of animals have a much greater resisting power than others.

Certain human beings are endowed with a low resisting power against tuberculosis, and it may be that they transmit this low resistance to their children. This hypothesis has frequently been advanced, but no reliable evidence either in support or otherwise is known to your Committee. Inherited low resistance must be considered as a possible factor, and one which should be made the subject of further study.

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A second explanation of special family incidence consists in unfavourable family environment, which doubtless accounts for much that is attributed to inheritance.

A third and far-reaching explanation of family incidence is that of direct personal infection. The members of a family in which a case occurs are exposed to infection from that case to a much greater extent than other persons; and clearly the probability of "family infection" is great. An infant in arms being nursed by a tubercular mother is in very great danger of becoming infected by that mother—the danger amounts in practice to certainty.

An investigation in Holland into a large number of actual cases of tuberculosis showed that amongst 1,510 patients (*a*) the actual source of infection was undiscovered in 488. (*b*) In 823 (54·5 per cent.) the infection was acquired beneath the parental roof. (*c*) In 199 the source of infection was said to be the husband or wife, fellow-workers, friends, servants, boarders, persons nursed, or, in thirty cases, residence in an infected house.

The very high percentage of family infection is especially notable.

The factor of inherited resistance should be further investigated, but, as a matter of practical reform, steps should be taken to reduce family infection to a minimum.

INFECTION FROM ANIMALS.

Undoubtedly infection of human beings from animal sources has been very common, and still is more prevalent than it should be. Bovine animals infect through milk and imperfectly cooked beef, while pigs infect through imperfectly cooked pork. These phases of the tuberculosis problem have been very thoroughly discussed in many official reports, and the principal facts are now well understood. Reference has already been made in this report to the improvement in New South Wales in the years following on the introduction of the Dairies Supervision Act, and similar experiences have been recorded elsewhere. One of the important facts recorded by the British Royal Commission on Tuberculosis was that, not only does a cow showing visible external lesions of the udder secrete tubercle bacilli in the milk, but a cow which is affected by internal generalized tuberculosis may also, and frequently does, secrete tubercle bacilli in the milk. This was experimentally shown by the inoculation of a cow with tubercle bacilli. The bacilli were injected into the neck, and at the end of the first week the milk was infected enough to produce tubercle in guinea-pigs, and at the end of thirty days the cow died with generalized tuberculosis. Professor Delépine, of Manchester, working on the basis that examination of the milk supply of the city would afford a valuable indication of the presence of tubercular danger, obtained very interesting results. By careful examination of the milk supply in Manchester, and adequate steps on the discovery of any infected source of supply, the percentage of mixed milk samples (i.e., milk as supplied to the public) found infected with tubercle bacilli in Manchester has been reduced in ten years from 17·2 to 5·14.

The bovine type of bacilli is especially responsible for tubercular affections of the glands, the bones, and the joints.

In Edinburgh 20 per cent. of samples of milk infected guinea-pigs with tuberculosis, and in Edinburgh the bovine type of bacilli has been found to be abundant in tubercle of the cervical glands.

In the investigations carried out on behalf of the British Royal Commission, 20 per cent. of tubercular bones and joints were found to be due to tubercle bacilli of the bovine type.

There can be no doubt concerning the damage done, especially to young children, by tubercular infection of the bovine type from milk, and these childhood infections are of the kind which renders them in their early life cripples or chronic invalids, living many years dependent upon charity or upon pensions for their existence. The methods of control are well enough defined, and it is not necessary to rehearse them in detail. Your Committee strongly urges that all sources of milk supply should be thoroughly investigated, and that all recognized methods of control should be brought into operation without delay.

That a great deal can be done in the direction of reducing bovine tuberculosis is evidenced by the decrease in the amount of tuberculosis in cattle slaughtered in Melbourne.

In the Melbourne City abattoirs careful notes of the numbers of cattle affected with tuberculosis in 1884-5 were kept for the Board appointed to inquire into tuberculosis in cattle, and it was found that 5·6 per cent. were so affected.

It is satisfactory that the total percentage of tubercular cattle (and this includes all cases of tuberculosis in any degree) has fallen within the thirty years from 5·6 per cent. to 1·01 per cent. It should be possible to reduce the amount to a fraction of that now prevailing.

The low percentage of tuberculosis amongst calves is especially noteworthy.

It would appear that in New Zealand no such improvement has been recorded. Dr. Gilruth reported in 1906 for the three years ending March, 1905, that the percentage of animals found tuberculous was as follows: Fat bullocks and heifers, 3·7; cows, over 10; pigs, nearly 4. Yet the human rates in New Zealand are lower than those in Australia.

RELATIVE IMPORTANCE OF HUMAN AND BOVINE INFECTIONS.

The British Royal Commission on Tuberculosis, which published its final report in 1911, examined very carefully the question of the relative importance of human and bovine infection in the production of various forms of human tuberculosis.

Of the total of 108 cases of human tuberculosis investigated eighty-four yielded human tubercle bacilli only, nineteen yielded bovine tubercle bacilli only, and five both bovine and human tubercle bacilli

Of sixty cases of human tuberculosis (not pulmonary phthisis) fourteen, or nearly one in four, gave the bovine type.

Considering the cases other than pulmonary tuberculosis, the distribution is as follows: Human origin, 44; bovine origin, 17; mixed origin, 5.

Of twenty-eight alimentary cases in children exactly half gave the bovine type.

Concerning tubercle of bones and joints, Eastwood and Griffith recently reported that out of 261 cases 196 gave the human type of bacilli, 55 gave the bovine type, and 16 gave atypical forms.

The lesson to be learned from the results of careful scientific research, extending over ten years, is that most of the tuberculosis affecting parts of the body other than the lungs is due to infection from a human source. But a considerable proportion is, nevertheless, due to infection from bovines, and the principal vehicle for the infective material is milk consumed in childhood.

From the point of view of the payment of pensions by the Commonwealth, it is of some practical importance to note that tuberculosis of the lungs, and tuberculosis of bones and joints formed the only important tubercular groups amongst the causes of invalidity. The findings of the Royal Commission indicate that infection of human origin is the only form of infection that needs practical consideration in connection with tubercle of the lungs, and is the most common form in tubercle of bones and joints.

But it must be remembered that the minimum age for receipt of pensions is sixteen years, and the damage done by bovine infection is mostly accomplished before that age is reached.

In 212 specimens of phthisical sputum Dr. A. S. Griffith found standard human bacilli in 205, atypical human in four, and standard bovine in three. In 736 cases tested by foreign observers only three gave bovine bacilli, and in two of the three human bacilli greatly preponderated.

Dr. A. Ghon, from post-mortem examinations of babies and children in Vienna, found that a primary infection of the lungs represents the usual form of tuberculous infection in Vienna, even in the young.

Evidences of Widespread Infection with Recovery.

Various observers have demonstrated the very great frequency of small tubercular deposits which have occurred in persons with sufficient resisting power to overcome these incipient infections, and to so surround the deposits of tubercle bacilli with healing tissue that they are rendered innocuous. When the widespread probability of tubercular infection is considered, it is not surprising that many persons receive the infection, although this infection does not, fortunately, in the majority, progress to manifest disease. The Germans have a sort of proverb to the effect that "every man has eventually a trifle of tuberculosis." Naegeli found that 98 per cent. of the persons on whom he made post-mortem examinations showed some sign of old or present tuberculosis.

The cutaneous test introduced by von Pirquet has been used to demonstrate that a very large proportion of persons are infected in slight degrees in early childhood. A similar test has been employed with the conjunctiva of the eye. In Vienna, Hamburger and Monti showed that 95 per cent. of children who attained the age of 11 to 16 years had been infected.

Dr. Albrecht, in Vienna, made careful post-mortem examinations in 3,213 children, and found evidences of tubercular infection in 1,060, or 33 per cent.

Sir Harry Allen, in his experience as Pathologist to the Melbourne Hospital, has found that in a large proportion of the patients dying from other causes there are evidences of old slight tuberculous infections, such as local adhesions at the apex of the lung, or pigmented thickenings in and beneath the pleura near the apex, or definite apical scars with or without encapsuled dry caseous or calcified relics beneath the scar, or traces of calcification in bronchial glands. Calcified mesenteric glands are relatively uncommon.

It is possible that in overcoming these slight infections a sort of vaccination takes place, so that the power of the system to react against tubercle is increased.

While there is no direct evidence available, apart from the results of the skin and conjunctiva tests, to indicate whether these minor and healed infections are mainly contracted in early life or widely distributed throughout the years of life, yet from the various facts, such as that recorded by Albrecht, that children show not more than 33 per cent., the curves of age-incidence given by Brownlee and quoted above, and the varying ages of onset of symptoms, it may be presumed that these infections occur frequently throughout the years of life. The two alternative means of preventing such infections are (*a*) so to deal with the sources of infection as to render them non-infective; (*b*) so to treat all persons that their resistance is raised to such a point as to prevent infection occurring. The various aspects of these two alternatives will be dealt with in some detail later in this report, but an indication may be given of one possible field of research which may be found to give good results. Protection by prophylactic vaccination has now been found to afford a very complete measure of protection against many of the infectious diseases, and although a satisfactory vaccine for tuberculosis has not yet been discovered, there is no reason why such should not be discovered in the near future, and used particularly for the protection of those whose family ties or daily duties involve their exposure to infection.

Control of Human Sources of Infection.

It is universally agreed that the person with an "open" focus of tubercular infection in the lung.

who disseminates massive quantities of tubercle bacilli during coughing and expectoration, is the most serious element of danger in the spread of tuberculosis. This has been so abundantly demonstrated that it can be accepted without reservation.

A very careful study of groups of families with and without a known tubercular member was made in Minneapolis, U.S.A. The results of this investigation are very striking, and they are the more striking in that they are not only not unique, but are typical of the results of similar investigations in many other places. They are recorded by the investigator, Dr. H. T. Lampson, as follows: "I conclude from the above studies, first, that the spread of tuberculous infection in families where open cases of tuberculosis exist is greater than it is generally understood to be. Sixty-seven per cent. of the individuals of these families, excluding the centre cases, show evidence of tuberculous infection. In no case where there has been definite proved exposure of a family to an open case of tuberculosis, no matter what precautions have been taken, have I failed to find a spread of infection. In at least ten cases investigated the infection has spread to the limit of available material. Every member of these ten families shows evidence of tuberculous infection.

"Second, that in families where no cases of tuberculosis have been found, no matter what the home life or living conditions were, the number of individuals showing evidence of tuberculous infection was small, namely, 2½ per cent.

"Third, that in families where cases of latent tuberculosis exist, the spread of infection is not as great as in families where open cases of tuberculosis are found—22 per cent. against 67 per cent.

"Fourth, that in families where healed cases of tuberculosis are present, the spread of infection is less than in families where open cases exist—33 per cent. against 67 per cent.

"Fifth, that in families where no tuberculosis is found, the number of individuals showing evidence of infection is very small (2½ per cent.) in comparison with the families in which open, latent, or healed tuberculosis exists."

The British Departmental Committee in its final report states the position as follows: "One of the principal sources of danger at the present time is the existence of a number of persons in the more acute and advanced stage of the disease living in the intimate contact with their families and neighbours which is necessitated by the ordinary conditions of their lives."

The results of the investigation in Holland should also be recalled in this relation. These summarized results of a particular investigation in a limited field may well be taken as a summarized statement of the whole tuberculosis position. Milk and meat do produce tuberculosis—principally of the glands, bones, and joints—but the amount of tuberculosis so produced, as compared with the direct transmission by infection from man to man, is relatively of minor importance. The International Congress on Tuberculosis, held at Washington, U.S.A., in 1908, adopted the following resolution: "That the utmost efforts should be continued in the struggle against tuberculosis to prevent the conveyance of tuberculous infection from man to man as the most important source of the disease."

We have, therefore, the fundamental fact that infection from man to man is the principal method of spread of the disease. Not only is this true, but the general deductions from the Minneapolis investigation are also true in general. They may be broadly stated as follows: (1) Where there is not much expectoration and not much excretion of tubercle bacilli there is not much infection of surrounding persons; (2) where there is greater dissemination of tubercle bacilli in expectoration there is much greater amount of infection. This spread of infection is seen at its maximum in such instances as those ten families *in which every member was infected*.

When these two generalizations are considered along with these other two, viz. (1) that in families where there is no tubercular focus a very small amount of infection is found, and (2) that in no case where there has been definite proved exposure of a family to an open case of tuberculosis, *no matter what precautions have been taken*, did the investigator fail to find a spread of infection, it is clear that while bovine control should be strictly observed, yet the spread of tuberculosis is dependent upon infection of one person by another *principally at short range*, and that the elimination of tuberculosis is primarily a question of the discovery and control of these infective persons; and it is also clear that protective treatment of those who are constantly in contact with the infective persons is essential to success.

In 1902 an investigation was carried out by Dr. W. P. Norris and Dr. E. Robertson, of the Victorian Health Department, into the conditions associated with the cases of tuberculosis whose deaths were reported during 1902. It was found during this investigation that in 30 per cent. of the cases a history of intimacy or relationship with an already infected person was obtained, the great majority of these cases being those of females who had assisted in tending and nursing persons suffering from pulmonary tuberculosis.

In Melbourne City during 1915 investigation was made into 179 cases of tuberculosis reported during the year:—

	Per cent.
A history of previous consumption in members of the family was obtained in	23 or 12·8
There had been a history of previous consumption in the house in which the patient was living at the time of investigation in	4 ,, 2·2
There was a history of having lived with a consumptive in	17 ,, 9·5
There was a history of having been associated with a case of tuberculosis at the place of employment in	4 ,, 2·2
Total in which there was an admitted possibility of direct personal infection ...	48 ,, 26·7

In 1909 all cases of pulmonary tuberculosis reported during that year to the Central Board of Health in Western Australia were investigated as carefully as possible. It was shown that in 34 per cent. of the cases there was sufficient evidence to justify the conclusion that the disease originated by direct exposure to infection from another case.

During an examination of miners in Western Australia in 1910, sixty-five cases of tuberculosis came under notice. In these cases 50 per cent. gave a clear history of close contact with cases of tuberculosis.

At this point it might be well to recall that infection may be acquired not only in the home, but in the factory or office, the lodging-house, or in the mine. Above all other sources infection is acquired in the home.

Necessity for Notification.

A knowledge of the existence of infective foci is an essential to any organized attempt to reduce the amount of tuberculosis in any community. Notification indicates where danger of infection exists and where measures of control should be brought into operation. Notification is the fire-alarm of sanitation. In the control of tuberculosis the notification of a case should at once be followed by (*a*) effective precautions to prevent further infection spreading from the patient; (*b*) minute examination of all contacts to detect early infection in any person, and appropriate measures for the cure of any early infections so detected.

While notification is essential, it is necessary in order that it should be successful that it should be regular, systematic, and rigidly enforced. It would not be unreasonable to extend existing legislation so far as to require all registrars of death to report deaths from tuberculosis (and the same provisions might apply to other infectious diseases) to the health authority, so that the completeness of notification during life might be checked, and, incidentally, the necessary precautionary measures of disinfection and cleansing. It is also advisable that all forms of tuberculosis should be notified, as cases of non-pulmonary tuberculosis are often the first danger signal indicating an open case in the family.

Isolation of Infective Persons.

The first step of importance to be taken after the discovery of the infective person is to render the spread of infection impossible. No objective less comprehensive than this should be contemplated.

The patient in the early stage, who has few bacilli in his expectoration, may be dealt with along the lines of scrupulous personal cleanliness —lines which are now well established for the tubercular person, such, for example, as the careful collection and disinfection of all sputum, coughing into paper handkerchief, and so on. These measures are very generally adopted, and may succeed; but, in view of the results of the Minneapolis inquiry, where it was found that infection occurred in every instance of exposure to an open case of tuberculosis, *no matter what precautions were taken*, the success of these measures —hitherto accepted as reliable—might well be carefully investigated. It would, in any event, be safer to insure, in every instance where it is possible, that the patient be removed to an institution where trained supervision is constant and reliable.

The more advanced cases, emitting massive doses of infection at every paroxysm of coughing, are the real *fons et origo malorum* of tuberculosis. The unanimity of opinion as to the desirability of insuring the segregation of such persons is evidenced by the following expressions of opinion by very authoritative bodies:—

The Conference of Principal Medical Officers resolved "Legal power should be given to the Central Health Authority to remove dangerous consumptives into segregation on the order of a police magistrate, given after private hearing, on application of the Central Health Authority."

The British Departmental Committee expresses itself unmistakably: "The Committee desire, therefore, to recommend, as an effective means of preventing the spread of the disease, the compulsory isolation of certain cases which are in a high state of infectivity, particularly in those instances where the patients' surroundings are such as to increase the risk of other persons becoming infected."

The New South Wales Advisory Board expressed the same conclusion: "In cases of tubercular phthisis, where the surroundings of the patient, owing to poverty or other reasons, cause home nursing to be against the interest of the patient or the community, the medical practitioner under whose care he may be shall cause to be sent to the Board of Health a specimen or specimens of the sputum of such patient, and if the presence of tubercle bacilli in the sputum be demonstrated, shall notify him as being in an infectious state, and that home nursing in the interest of the patient and community cannot be efficiently carried out. The Board recommended that legal power should be given to remove such cases for efficient care and treatment on the order of a magistrate."

It has been repeatedly affirmed by the most reliable authorities that no one immediately practicable measure offers so great promise of material reduction in the tuberculosis rate of a community as that of the provision of hospital accommodation for advanced cases. Such provision offers not only the definite advantages presented by segregation as limiting the extent of infection, but there is additional value to be gained by the education of patients in matters of personal hygiene and in methods for preventing the spread of infection.

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PROVISION FOR CURATIVE TREATMENT ALSO NECESSARY.

The isolation of advanced cases is essential, but experience has shown that it is not desirable to mix those early cases who offer a reasonable prospect of cure with those whose disease has so far advanced that the prospect of cure is remote.

Many cases in the early stages will be notified by the medical attendant, and a large proportion of these will be so circumstanced that they could not obtain the necessary institutional treatment except at public expense.

The investigation which should automatically follow upon notification will reveal in many families incipient cases of tuberculosis of the lungs, of the glands, and of the bones and joints. Many of these also will require institutional treatment.

For this large group the type of institution now familiarly known as sanatoria is required. The functions of these institutions may be summarized by stating that in them the patients are taught how to regulate their personal habits of food, clothing, general habits, and cleanliness, so that their resisting and recuperative powers are built up and they are placed under the best conditions for Nature to effect a cure. They go to sanatoria for cure and for education, and the cure rests mainly upon education. So true is this that it is practicable to discharge many before the cure is effected, their education having progressed to a stage at which they may be trusted to continue their own cure and prevent the infection of others. They are taught what to eat and what not to eat; what form and amount of exercise to take; when and how to bathe; to avoid alcohol and tobacco; what clothing to wear; what undesirable habits to give up and what desirable habits to cultivate; and, above all, what precautions to take so that others may not suffer infection by their carelessness.

RESULTS OF SANATORIUM TREATMENT.

Dr. Kinghorn, of the famous Saranac Lake Sanatorium, stated that "any patient, taken in time, is practically sure of being cured."

That such complete optimism is not justified is shown by the results obtained under very good conditions at the Frimley Sanatorium in England.

The Frimley Sanatorium was associated with the well-known Brompton Hospital in London. The cases at this sanatorium were all transferred after examination at the Brompton Hospital. The cases were not chosen at random, still less was every case at Brompton passed on to the Frimley Sanatorium. On the contrary, the cases sent were carefully selected, only those patients being chosen who were free from fever or other serious constitutional symptoms, who possessed considerable vitality and had already begun to show signs of improvement. So far as possible, also, patients with signs of limited disease were preferred, although it was found that patients with disease extensive, but of a quiescent type, often did remarkably well. Another important point borne in mind, in selecting cases at Brompton to be sent to the sanatorium, has been the likelihood of the patient obtaining work upon his discharge from the institution—since it early became apparent that if the patient had no work to return to after leaving the sanatorium, he would almost certainly relapse quickly through inability to obtain adequate nourishment. These circumstances, therefore, combined to afford conditions such that the sanatorium should achieve the best results possible. What were the results obtained?

The period of investigation was from March, 1905, to December, 1910, and cases were followed up after their discharge.

Among 690 patients 55·9 per cent. were well and able to work at the end of the fourth year following that in which they were discharged. At the end of the fifth year 48·4 per cent. were in the same condition.

"These results compare not unfavourably with those relating to the German Sanatoria in which patients are treated under the provisions of the Invalidity Insurance Law. Nevertheless, in view of the careful selection of cases for the Frimley Sanatorium, it was hoped that a larger percentage would have retained their health. It must be remembered, however, that in many cases the patients have not had work to return to after leaving the sanatorium, and too often this has meant a return to unsatisfactory home conditions and insufficient food, with consequent relapse.

"There can be no doubt that to insure the maximum benefit from sanatorium treatment efficient after-care and supervision are essential."

It was also found that lasting benefit is more likely to follow when the patient comes under treatment in an early stage of his disease than when large areas of lung are already involved.

Sanatoria, then, while accomplishing much good, are yet so far from perfect and complete in their results that more attention should be paid to measures of prevention than to those of treatment.

Sanatoria fail for the reasons that the cases enter when the disease is advanced, and that cases cured or materially improved must frequently return to an unhealthy environment, and often find themselves unable to earn a sufficient income.

FARM COLONIES.

Dr. A. A. Brown has quite recently drawn attention to the fact that this difficulty is encountered in Victoria also. He expresses the results of his own experience at the Greenvale Sanatorium as follows: "The care and treatment by the State of consumptives, especially early cases, is a praiseworthy undertaking, but the present method stops far too short of securing permanent benefit to the afflicted. Whatever good results have been achieved at sanatoria, it is quite possible that a great many cases will again relapse, because the surroundings to which the patients return on leaving the sanatorium are quite unsuitable towards fostering and maintaining the cure or benefit received during residence at the institutions. To continue the benefits of treatment received at sanatoria and to train patients in country work, a farm colony in association with a guiding institution is an indispensable factor."

Such farm colonies, carefully designed, and under wise direction, have been very valuable adjuncts to the other means for treating tubercular patients.

AUSTRALIAN EXPERIENCE.

With these facts before us it is of interest to ascertain with regard to Australia (1) What special institutional accommodation exists for (*a*) segregation of advanced cases; (*b*) treatment of early cases. (2) The results of treatment in sanatoria.

New South Wales.

Accommodation.—Waterfall State Sanatorium: (*a*) Division for males, 230 beds; (*b*) division for females, 120 beds.

Queen Victoria Homes for Consumptives: Wentworth Falls, for males, 54 beds; Thirlmere, for females, 54 beds; R. T. Hall Sanatorium, 16 beds.

Results of treatment: State Sanatorium at Waterfall, for the year ending June 30, 1911: Disease arrested, 39; much improved, 52; slight improvement, 55; no apparent benefit, 29; died, 108; total, 283.

Accommodation (*a*) for early cases: Greenvale Sanatorium, 100 beds (70 male, 30 female); Amherst Sanatorium (female cases only are taken here), 62 beds. (*b*) For advanced cases—Heatherton Sanatorium, 90 beds (60 male, 30 female); Austin Hospital, 120 beds.

It is interesting to note that experience shows that the institutions for advanced cases are always full, whereas the sanatoria for early cases frequently have empty beds.

There are also some private sanatoria concerning which information is not available.

Results of treatment: No statistics are of great value for Victoria, as it is the practice to keep patients in the sanatoria for periods of three months only, largely for educational purposes. The average duration of stay is about seventy days. The value of the education is largely discounted by the fact that patients have, in many cases, to return to very unsatisfactory surroundings.

South Australia.

Accommodation for early cases: Kalyra Sanatorium, 52 beds. For advanced cases: North Terrace Consumptive Home, administered in connection with the Adelaide Hospital, 68 beds.

Results of treatment at Kalyra Sanatorium for the years 1914-1915: Remaining on July 1, 1913, 46; admitted up to June 30, 1915, 262; total, 308. Condition on discharge: Disease arrested, 46; improved, 146; unimproved, 80; died, *nil;* remaining on June 30, 36; total 308.

Tasmania.

Accommodation for early cases: New Town Sanatorium, 37 beds. For advanced cases: Consumptives' Home, New Town, 15 beds.

Particulars of cases at New Town Sanatorium for the years 1915 and 1916: Remaining in hospital at beginning of year, 16; admitted during year, 84; total, 100. Discharged, 68; remaining, 32; total, 100.

Results of treatment: Arrested, 38; greatly improved, 8; unimproved, 12; left for other reasons, 10.

Queensland.

Accommodation for early cases: Dalby Sanatorium, 62 beds. For advanced cases: Diamantina Hospital, 60 beds; Dunwich, 35 beds.

Results of treatment, Dalby Sanatorium, for year ended June 30, 1916: Arrested, 12; improved, 39; condition unaltered, 45; total, 96.

Western Australia.

Wooroloo Sanatorium has 300 beds. The results obtained are not available.

The total number of beds available in Australia specially for tubercular cases is 1,483. It is not practicable to divide this accommodation specifically into that for early cases, and that for advanced cases, as some institutions—e.g., Wooroloo Sanatorium, in Western Australia—admit both classes without reserving any special number of beds for either class. No account is taken of beds which may be available in general hospitals and other similar institutions, but even allowing for this factor, it is clear that the accommodation available in Australia for tubercular cases falls far short of requirements, and at least twice the present accommodation should be provided. Probably even this would be insufficient.

DISPENSARIES.

It is clear from what has been said above that in the campaign against tuberculosis the foremost place must be given to early detection of sources of infection (which implies notification rigidly enforced), effective measures to prevent further infection from such persons (which implies segregation or in other cases adequate precautions), and careful search amongst contacts for incipient cases (which implies a dispensary system).

The dispensary system was instituted by Sir Robert Philp, of Edinburgh, with the object of providing a clearing-house, as it were, for cases of tuberculosis. The principal functions of such a dispensary are:—

(1) Cases of tuberculosis are seen and divided into groups. Those requiring sanatorium treatment

are sent to sanatoria; those requiring surgical treatment in hospital sent to hospital; some are treated in their own homes; while provision is made for advanced cases in hospitals and other institutions.

(2) Advice on all matters connected with tuberculosis is freely given to any applicant.

(3) Very careful instructions, suited to the needs of each individual case, are given concerning all the precautions that should be taken both for their own health and for the safety of those around them.

(4) The home of each patient is visited to see whether the house is healthy and the methods of family life hygienic. Where unhealthy conditions are found the health authorities are notified.

(5) Not only does the dispensary begin the supervision of the treatment of the consumptive, but it continues its supervision over them after improvement or cure—preventing relapses, finding suitable employment in farm colonies specially instituted for the purpose, and doing any other similar action to encourage and maintain the improvement resulting from the treatment.

(6) The dispensary concerns itself also with the financial status of the patients, and uses its influence to provide material relief for those whom illness has brought to poverty.

(7) It acts in conjunction with the educational authorities, removing children found to be infected from school, and taking them away from conditions of school life which are detrimental to them. It also arranges for open-air schools for consumptive children.

(8) The principal function of the dispensary may, however, be said to be its prospecting work. From the centre-point of the patient who presents himself for advice and treatment the dispensary authorities start investigating his contacts—in the family, in the school, in the factory or office—but principally in the family. In this way they discover the early cases—the curable cases. Every such case removed from his environment and treated represents not only a case probably cured, but the removal of a person who at a later stage would develop into an active focus of infection.

It would not be out of place to have a law requiring that when a case of tuberculosis is notified every member of that patient's family must be examined, and the results of the examination reported to the health authorities. A necessary corollary to this would be the provision of suitable treatment for those found to be infected. But all countries are now coming to recognize the absolute necessity for providing means for such treatment.

Such a dispensary organization would require the necessary hospital accommodation, necessary sanatorium accommodation, suitable centres for examination at which all patients could get the advantage of skilled advice. In order to enable all persons to have the advantage of the advice, evening clinics on one or two evenings weekly would be necessary. Visiting nurses to visit patients' "contacts" in their homes would be an essential part of the organization, and complete co-operation with the health authorities alone can produce the sanitary improvements which will inevitably be found to be necessary. Co-operation with the registrars of death is also necessary in order to secure information concerning persons who have died from tuberculosis and whose tubercular condition was not previously known to the authorities.

BUREAU FOR CO-ORDINATION OF ADMINISTRATIVE MEASURES AND FOR THE PROMOTION OF RESEARCH.

The provision of sanatoria for the treatment of those whose condition offers prospect of cure; the necessity for taking such measures as will prevent the spread of infection from advanced cases; the very valuable part played by tuberculosis dispensaries in any tuberculosis campaign, particularly by the detection of early cases, have all been indicated. But the vital part of any scheme against tuberculosis is the central control and co-ordination of all these various activities. Each local centre should be made aware of the experience gained in any direction by other local centres; it should carry out investigations into special subjects of interest; and it should act as the centre for all educational movements in connection with the attempt to eradicate tuberculosis.

In other countries private or semi-private agencies have established such dispensaries and central bureaux, but in Australia the most suitable arrangement would be for the Health Departments to establish the Central Bureau as a branch of their own organization and for them to co-ordinate and direct this work. Unfortunately, however, it must be admitted that too often the officers in Health Departments do not get the encouragement and financial assistance necessary to preserve the enthusiastic desire to improve the health of the people with which they often start their administrative career.

No campaign against tuberculosis, or any other disease, can hope to be successful unless the responsible Governments are prepared to set aside the necessary money, and are prepared to support whole-heartedly the efforts of their officers to inaugurate and successfully carry out a systematic scheme of operation.

What may be done is evidenced by the work of two institutions.

The Tuberculosis Dispensary in Edinburgh, begun by Sir Robert Philp in 1887, has had a striking success in the reduction of the tuberculosis death-rate in Edinburgh.

The Henry Phipps Institute was founded by Mr. Phipps in 1903 to carry on "the study of the cause, treatment, and prevention of tuberculosis and the dissemination of knowledge on these subjects; the treatment and the cure of consumptives."

The work done by this institute is not only administrative in character along the lines of a tuberculosis dispensary, but there is carried out also a scheme of research of that intensive variety which is most productive of valuable results.

In Melbourne the Health Department has a Tuberculosis Bureau, which has a somewhat limited sphere of application. A nurse is attached to this bureau, which is open every day, and patients attend to the number of from four to ten daily. Patients are not seen by a medical man at the bureau, but are directed to certain hospitals or medical men for examination and certification. This bureau could, doubtless, be extended in scope with advantage.

In Sydney several tuberculosis bureaux are in operation or are projected.

TUBERCULOSIS AND THE INVALID PENSIONS ACT.

In an earlier portion of this report reference has been made to the number of persons brought by tuberculosis to a condition in which they are permanently incapable of earning their own living.

Cases are known to your Committee in which other members of the family have become infected from the pensioner. The receipt of the pension may be sufficient to prevent the sufferer entering an institution, thus retaining him as a permanent focus of infection within the home. In this way the payment of pensions may actually be the payment of premiums for the spread of tuberculosis. Those infected by the pensioner may be an ever-increasing liability upon the finances of the Commonwealth, as it is probable that some, if not all, of the children so exposed to infection will ultimately become claimants for pensions in their turn if they do not die before reaching the minimum pension age. Such a condition of things is economically unsound, and it would be wise policy for the Commonwealth Government to consider means for the removal of the infective persons to an environment in which they could do no further harm.

Segregation.

Your Committee suggest that it would be economical as well as humane for the Commonwealth Government to provide or arrange for the provision of sufficient hospital accommodation in the various large centres of population for the treatment of advanced cases of phthisis who are in receipt of pensions.

Your Committee is of opinion that legal power should be given to order the removal to hospital of any such case, as it is obvious that any claimant for pension will be in such financial circumstances as to render adequate precautionary measures impossible.

Your Committee, however, is strongly of the opinion that payment of the pension to the invalid should continue notwithstanding the maintenance provided by the Government in the shape of hospital accommodation.

Even if legal power of isolation is not taken by the Commonwealth Government, your Committee still would recommend strongly that adequate hospital accommodation be provided, and that phthisical persons in receipt of invalid pensions be induced to take advantage of this provision.

In addition to such provision by the Commonwealth Government, it is recommended that other Governments responsible erect hospital accommodation for advanced cases, so that there may be available a bed for every advanced case of tuberculosis in the State concerned. Such institutions could be widely distributed in small units, and experience has shown in Australia that there is no necessity to build costly structures, comparatively inexpensive buildings having been found to be quite satisfactory.

It has been repeatedly affirmed by the most reliable authorities that no one immediately practicable measure offers so great promise of material reduction in the tuberculosis rate of a community as this one of the provision of hospital accommodation for advanced cases. Quite apart from the definite advantages presented by segregation as limiting the extent of infection, there is a great value obtained by the education of patients in matters of personal hygiene and in methods for preventing the spread of infection. The existing provision in Australia falls very short of the requirements necessary at this moment, and your Committee urges that such hospital accommodation should be immediately provided.

The Obligations of the Pensioner.

The Invalid Pensions Act at present involves no recognition by the pensioner of any duty to the community in return for the care the community gives him.

It would surely not be unreasonable for the community to demand that the patient should exercise proper precautions to prevent the infection of others. The Commonwealth Government might well consider the advisability of making the payment of pensions conditional upon the observance by the patient of at least the more important of the precautions recognized as necessary, as, for example, sleeping by himself, using proper sputum cups, &c.

Inquiry into Hygienic Conditions.

Before, however, practical restrictions based upon rational principles can be imposed, it is necessary that full information be obtained concerning the conditions under which, as a rule, pensioners are living, and the extent to which they are infecting others. A preliminary investigation by competent inquirers into the circumstances associated with each of the cases dealt with under the Invalid Pensions Act for one year would form a useful commencement, and would, without doubt, indicate the directions in which further inquiries should be made.

Colonial Medical Reports.—No. 74.—Commonwealth of Australia (*continued*).

INFECTION FROM INANIMATE OBJECTS.

Before the infection of any person from inanimate objects, e.g., clothes, dust, bedding, &c., can occur, a necessary condition is that such objects must themselves have become in some way contaminated. Tubercular material cannot originate *de novo*, it must have originated from some living creature infected with the tubercle bacillus. Such creature may be either human or animal. It is probably correct to say that the animal hosts may in this connection be ignored, and for all practical purposes it may be assumed that the contamination of inanimate objects, excluding meat and milk, is the direct result of the presence of some infective tubercular person in the environment concerned. If this person is not constantly present, but is a casual and unknown distributor of tubercular infection, then we have to deal with a wide variety of circumstances, some of which were indicated in the Report of the New South Wales Advisory Committee, e.g. (*a*) The handling of food in the course of manufacture, preparation, and packing by human carriers of the disease; (*b*) contamination of hotel rooms and bedding by casual occupants; (*c*) contamination of public vehicles in a similar way; (*d*) contamination of a house which remains undisinfected when the tubercular person ceases to occupy, and acts as a source of infection for subsequent tenants.

These matters involve two principal considerations: (1) The identification of the infective individual and the application of measures necessary to prevent his continuing to act as a focus of infection; (2) the application of such routine administrative measures as will reduce to a minimum the chance of the persistence of the infectivity of inanimate objects contaminated by a casual unidentifiable infective person.

The first of these resolves itself into identification which is compulsory notification, combined with systematic examination in the case of certain industries), and isolation, either in his own home or in an institution, or employment in a way involving only minimum risks.

The second includes in practice the whole range of sanitary administration, proper construction of houses, routine cleanliness in dwelling-houses and houses for public accommodation, routine disinfection of public vehicles, of houses in which tubercular persons live or have lived, and so on.

These are matters which have received so much attention that improvement can only be obtained by the perfection of the application of existing powers.

In one respect, however, an advance on present practice might well be made. In New York the systematic medical examination of persons engaged in the handling of foodstuffs at any stage in the course of their preparation and distribution has recently been inaugurated, and this practice could be adopted with great profit in the larger towns in Australia.

There is one very important aspect of this question. Tubercular persons are quite frequently carried on ship board as passengers, and are placed in the same cabin with other passengers, the cabin being used for further passengers without any measure of disinfection. This is a matter which, your Committee considers should receive prompt and effective attention.

FACTORS AFFECTING THE PROGRESS OF, OR THE SUCCESSFUL RESISTANCE TO, THE DISEASE IN A PERSON WHO HAS RECEIVED INFECTION.

An indication has been given above of the extensive occurrence of healed early tubercular infections. The obvious interpretation is that many persons are infected at some stage in their life-history, but their resistance is sufficient for them to overcome the infection. Others, of course, have not sufficient resistance, and become tubercular patients.

The two principal factors concerned in the determination of the results for infection are: (1) Personal resistance of individual infected; (2) effect of environment on the health of the person.

With regard to the comparative importance of either of these two factors very little can be said in the present state of scientific knowledge.

An accurate study of the importance of either inherited or acquired predisposition in controlling or favouring the disease should be begun as soon as practicable.

The effect of environment is conceivably as manifold as the variations of environment experienced by different individuals. The principal features of environment may, however, be discussed under two principal headings: Housing, and social or economic.

"Generally speaking, a healthy, sober, well-fed, well-clothed, and well-housed community is far less liable to tubercular diseases than one in which disease and drinking habits are prevalent, whose members are inadequately fed and clothed, and in which houses are crowded and insanitary. It may be broadly stated that an advance in material prosperity of the community as a whole will be reflected in a decreased incidence of tuberculosis." (Report of British Departmental Committee on Tuberculosis, p. 8.)

It is clear that no complete consideration of all the aspects of so extensive a subject can be attempted in a report such as this. Certain passages may, however, be quoted from the Report of the British Departmental Committee on Tuberculosis: "*Housing*.—The Committee believes that much may be done to assist in preventing tuberculosis by improvement of the housing conditions in this country. There is no doubt that dirty, ill-ventilated, dark, damp, and otherwise insanitary houses are provocative of the disease. There is equally no doubt that the incidence of the disease is greater where families are crowded into one or two dirty, ill-ventilated rooms than where better conditions are obtainable, or where the rooms are kept clean and ventilated. The Committee fully realize the difficulties surrounding the housing question, but they consider improvement in the present state of affairs both desirable and possible."

Newsholme also produces evidence to show that the index of total poverty agrees closely with the index of tubercle.

Your Committee is of the opinion that there is no need in this Report to discuss this aspect further. The methods of rectification of structural defects or of overcrowding are established both from legal and constructional points of view. Your Committee, however, strongly urges that more complete legal power should be provided for, and greater freedom of action allowed to executive officers of local authorities to require minor structural alterations in dwelling-houses where such are necessary to remove conditions of defective hygiene.

Overcrowding is one of the most important factors in the tuberculosis problem. It is, however, not merely a question of the limitation of the numbers of persons inhabiting a given space. It is entirely involved with, and dependent upon, economic conditions.

Upon this phase of the tuberculosis question the British Departmental Committee expressed itself as follows: "There is great need for research work in connection with the social and economic causes of tuberculosis. The present knowledge on the subject, though increasing rapidly, is inadequate, and it is highly desirable that more information should be obtained, and that the information when obtained should be sifted and co-ordinated so as to serve as a reliable basis for the preparation of remedial measures. Inquiries should be made into the causes which operate so as to give rise to the existing occupational incidence of tuberculosis, and into local and other factors which have a bearing on the problem of the distribution of the disease."

As an illustration of the difficulties existing at present in assessing the relative values of economic factors may be cited the interesting fact elicited during the inquiry by Dr. Norris and Dr. Robertson above referred to. During this inquiry the financial condition of the families concerned was ascertained, and it is recorded that "in 50 per cent. the barest dietetic necessities were available, and the possibility of even relative isolation practically *nil*. In a large proportion of these cases the assistance of charity alone enabled the patient to be maintained at home."

Interesting as this is, it leaves undetermined the question whether the tuberculosis was determined by the poverty or the poverty by the tuberculosis.

A great deal of investigation is necessary along these lines, and your Committee considers that very valuable work can be done by systematic investigation of these various economic aspects. The machinery of administration of the Invalid Pensions Act offers exceptional facilities for the conduct of such an inquiry, as one of the greatest difficulties usually met with in such an investigation of tubercular persons, viz., migration of individuals with loss of continuity, would not be experienced—the regular payment of pensions enabling the investigator to keep constantly in touch with the persons under supervision.

Such an investigation is immediately necessary in order to determine the *direct* relationship between tuberculosis and social economic conditions. There is, however, another field of inquiry. Any worker who is obliged to perform his daily duties under conditions of improper ventilation, lighting, heating, or in the presence of any other departure from adequately hygienic environment, will suffer by some departure from normal health. While such depression of general health has definite relationship to tuberculosis, it has also a very important bearing in other forms of invalidity.

It appears to your Committee, therefore, very necessary that an organized scientific study of the various phases of industrial hygiene should be commenced, and that the study of this subject should be continued and extended as industries develop and the directions of useful extension come to be indicated.

One phase of the economic question has received a great deal of attention within recent years, the amount of tuberculosis amongst persons engaged in certain trades, especially mining and metallurgical operations. An earlier portion of this Report shows clearly the excessive amount of tuberculosis in the Bendigo District of Victoria. This is naturally attributed to the effects of mining. But it is interesting to find that the Victorian Government Statist, from an analysis of the cases of pulmonary tuberculosis notified under the Health Act between 1909-1911, concluded that the incidence of the disease among *females* in Bendigo was somewhat heavier at most age-groups than that for the metropolitan area, while among males it was considerably heavier, *especially at older ages*. In Bendigo many miners past middle life, suffering from chronic respiratory diseases, subsequently die from tuberculosis.

It has been well determined that the "chronic respiratory diseases" referred to are directly associated with, and may almost be said to be to some extent an integral part of the occupation of mining, but it has not yet been satisfactorily determined to what extent tuberculosis may be regarded as the concomitant or the direct consequent of such "chronic respiratory disease." This is also a matter to which further attention might well be given.

THE STRAIN ON YOUNG ADULT FEMALES AND ON MALES AT LATER PERIODS OF LIFE.

The statistical evidence in the earlier portion of this Report shows clearly the great incidence of tuberculosis upon the young woman and on the man whose powers should be ripening to their full in early middle-age and on the man in later life. The Victorian Government Statist explains the greater frequency of attack in young women by the fact of the increased proportion of females engaged in manufacturing industries. Your Committee is not prepared to accept this hypothesis without reservation upon the evidence available; but it is clear that tuberculosis is attacking an unduly large proportion of young women and of men in middle and later life. This fact is of the utmost importance to the Commonwealth, and all factors contributing to this result, whether industrial or otherwise, should be carefully and closely investigated.

NUTRITION IN THE SCHOOL-LIFE PERIOD.

An inquiry concerning the health of London school children was summarized in the *Lancet* of January 9, 1915, p. 85. On entry to the schools, 10·8 per cent. of the boys and 9·8 per cent. of the girls showed poor and bad nutrition. On leaving the school the rates were decidedly worse, being 14·7 per cent. of the boys and 14·3 per cent. of the girls. The statistics varied greatly in different districts even among those containing great numbers of poor people. Even in the same district the figures might be very different for boys and girls. In Bermondsey the percentage of ill-nutrition on entering school was 5·6 for boys and 5·0 for girls; but at leaving time it was 28·5 for boys and 29·6 for girls. In Hammersmith the percentages for entrant boys and girls were identical —5·6; but at leaving school the rates were—for boys, 7·0; for girls, 12·0.

It would be well if the medical inspectors of school children in Australia were supplied with definite standards of nutrition, and if a watch were kept on the changes in nutritional percentages during the period of school life. Of 2,000,000 children examined by school doctors in Great Britain in 1910, 1 per cent., and in some districts 4 per cent., had tuberculosis in a readily recognizable form.

RECOMMENDATIONS.

(1) There are many factors associated with the occurrence and spread of tuberculosis that require careful study:—

(*a*) The reasons for the marked variation in death-rates from year to year, as between the different States, and between the sexes, should be sought for, and any evidence likely to throw light on the special features of tuberculosis in Australia should be carefully examined.

(*b*) An attempt should be made to ascertain whether heredity, *per se*, plays any part in the actual transmission of tuberculosis, or whether it has any large effect in the production of lowered resistance.

(*c*) Careful scientific investigation of the extent of the occurrence of bovine infection of humans in the Australian community should be undertaken by the laboratory examination of material from actual cases of tuberculosis.

(*d*) Laboratory examination of public milk supplies, on lines similar to those adopted in Manchester to determine the extent of infection disseminated by this means amongst the community, could profitably be undertaken.

(*e*) Carefully recorded results of post-mortem examinations might well be kept, so that very definite evidence should be available as to the amount of healed minor tubercular infections which occur amongst the Australian community.

(*f*) There is a wide range of bacteriological, pathological, and personal phenomena which require investigation. Such investigation could only be carried out in properly equipped laboratories.

The above aspects of this important question should be made the subject of research; but this research should not be haphazard. It should be co-ordinated; it should be thoroughly well-equipped financially; and every inducement should be offered to suitable graduates to devote their career to these fields of research, which often produce practical results of the most far-reaching importance to the community.

While these aspects are important, there are two other phases which are of equal and, perhaps, of more immediate importance:—

(*g*) It is vitally necessary that accurate information, carefully compiled, concerning the cases actually occurring in the Commonwealth should be obtained and studied. Administrative action may be based upon the experience of other communities, and this *may* be successful; but it is obviously more reasonable to expect success from measures based upon knowledge of what actually is occurring among our own people. It is important to ascertain how our tubercular cases become infected, to what extent they are infecting others, what economical or social factors have assisted towards the development of their disease. This is the only way to obtain that accurate knowledge which is the indispensable foundation of successful action.

(*h*) Industrial factors should be very carefully studied. One pertinent question might be put to illustrate the importance of this phase of the problem: Can quartz-mining be carried on without tuberculosis? This question is not yet settled; but there is reason for believing that by the exclusion of tubercular patients from mines, mining can be carried on without any associated tuberculosis. This might well be carefully investigated.

The amount of tuberculosis associated with other industries also requires study, with the object of determining whether such association is merely a matter of coincidence or is definitely an attribute of the industry. In the latter case remedies should be sought.

The hypothesis of the Victorian Government Statist that factory employment is responsible for tuberculosis amongst young girls should be very carefully examined, as it is, if well-founded, of the greatest importance.

The necessity for careful study of these two groups of questions is self-evident. Your Committee considers, however, that in the present conditions of national stress too much should not at first be attempted. Such a study should proceed carefully and gradually along well-ordered lines.

A preliminary investigation by competent inquirers into the circumstances associated with each of the cases that are dealt with under the Invalid Pensions Act would form a useful beginning for such an inquiry, and the results of such inquiries during one year would, without doubt, point out the directions in which further inquiries should be made.

(2) Administrative measures should be adapted to the knowledge and experience already available. It can hardly be said that advantage is being taken of all those methods of control which have been found to be valuable. These can be adopted more widely than at present, can be tested to determine the suitability of old-world methods to Australian conditions, and can be modified and improved in the light of the experience so gained.

(a) *Bovine Tuberculosis.*—The system of inspection of dairy cattle already in operation in certain districts in some of the States can be extended and improved. Municipal and city milk supplies merit a very great deal more attention than they receive at present, and advantage might well be taken of the Manchester method to examine these public supplies with special reference to tuberculosis, and to effect a decided improvement in this direction.

(b) A considerable extension of the machinery for the control of human infection is necessary.

The number of beds available for advanced (i.e., infectious) cases is very inadequate, and it is probable that an early increase in the number available would result in a definite and rapid decrease in the numbers of new cases arising.

Considerable extension of the dispensary system is required, with the object especially of detecting the early cases before they reach the stage when they are infective for others. A necessary corollary to this is the provision of sufficient sanatorium and hospital accommodation to afford a bed for every early case, not only of pulmonary tuberculosis, but also of the crippling bone, joint, and gland infections.

The close investigation of the hygienic conditions of the home and of the place of education or employment are of the utmost importance in any campaign against tuberculosis, and still more important is the necessity for executive powers to effect immediate rectification of such defects as are discovered.

Such investigation and such new powers would produce great results throughout the whole range of sanitary work, and would exercise a profound influence in the control of tuberculosis.

The Commonwealth Government has an extensive financial responsibility on account of tuberculosis under the Invalid Pensions Act, and it would be an economical, as well as a humane, policy for the Commonwealth Government to consider any means of effectively assisting towards the ultimate ideal of the eradication of the disease in Australia. Accordingly your Committee makes the following suggestion:—

That the Commonwealth Government co-operate with the State Government concerned in a vigorous campaign against tuberculosis in a selected locality in which it is more than ordinarily prevalent. The mining centre of Bendigo offers an exceptionally suitable field for such a campaign, affording as it does opportunities for attacking not only the general problem of tuberculosis in a municipal community, but also the special problem of tuberculosis in mines. The Commonwealth and the State working in co-operation could put into operation all those methods of control known to be useful elsewhere, and could establish their general value or discover modifications necessary for the conditions encountered in Australia. An attempt might with quite reasonable hope of success be made to reduce the tuberculosis death-rate in that district by half within five years. It would be necessary to provide a laboratory for examination of sputum and minor investigational work, a hospital into which advanced cases should be encouraged to go, a sanatorium for early cases, a dispensary for consultations, and as the centre of administration for the campaign, a small staff of visiting nurses, and two or perhaps three supervising medical officers. The active assistance of the city health staff would be required.

Such a scheme, the details of which could be easily elaborated, would serve many useful purposes; but it would particularly serve as a practical experiment on a large scale, and would indicate the measures which might usefully be applied elsewhere in Australia. Provision for financial assistance to families while the breadwinners were receiving treatment might also be found necessary.

The lack of medical men might cause some difficulty in bringing such a scheme into full operation during the War, but a commencement might well be made at once in certain essential directions.

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